

180

CONNEXION

NAGRA® IV

SERVICE MANUAL

Price : US\$ 5.-
Prix : Fr.s. 20.-

TYPE IV D & IV L

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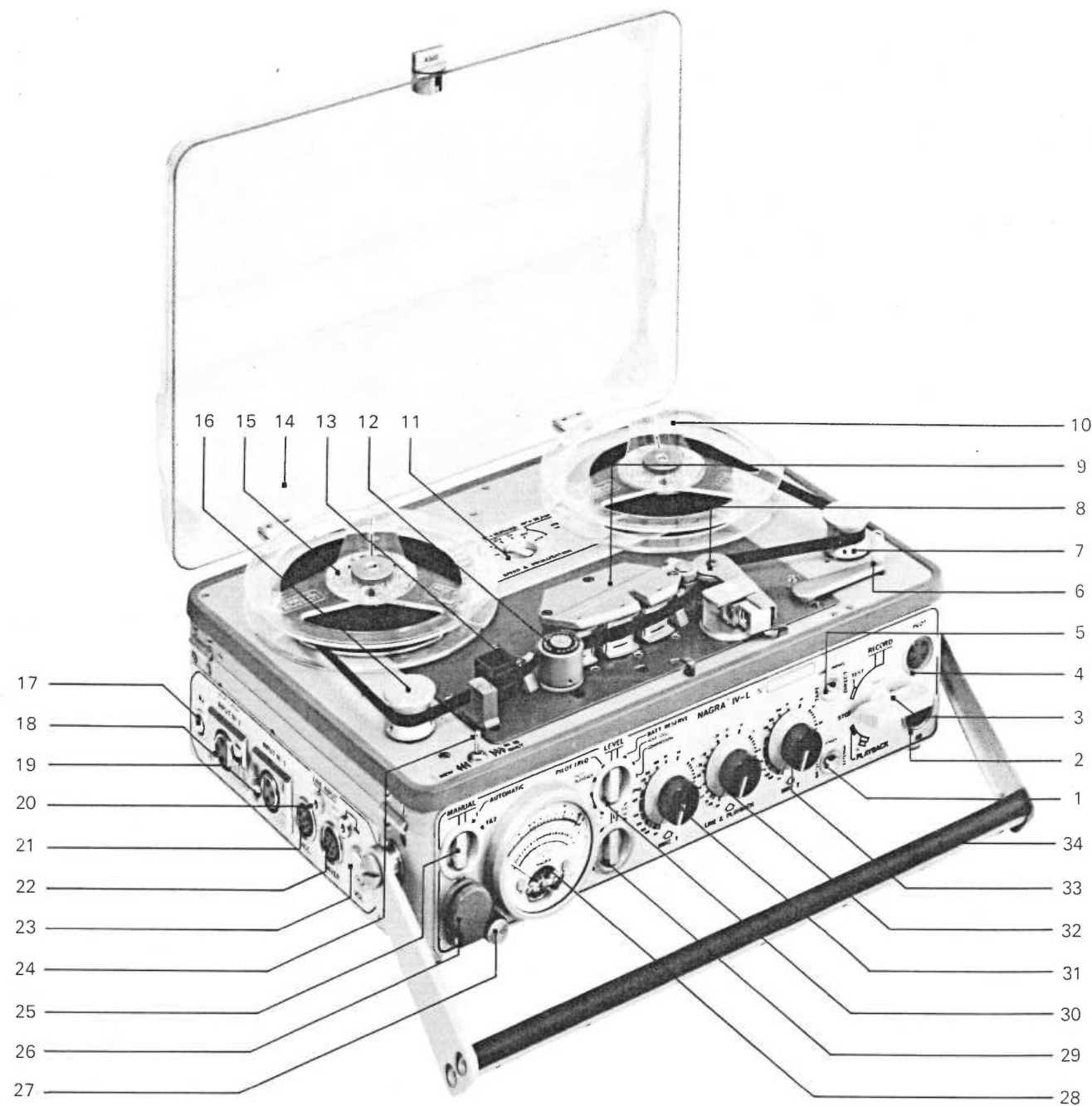
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NAGRA IV L

- 1 - Power Selector
- Interrupteur "Batteries-Alimentation externe"
- Batterie-Aussenspeisung Umschalter
- 2 - AR Indicator
- Voyant AR
- AR Schanzeichen
- 3 - Principal Function Selector
- Commutateur principal
- Hauptschalter
- 4 - Pilot Indicator
- Voyant pilote
- Pilotschanzeichen
- 5 - Tape/Direct Switch
- Interrupteur Tape/Direct
- Tape/Direct Umschalter
- 6 - Pinch wheel and Tape Guide Control Lever
- Levier d'engagement du contre-cabestan et des guides
- Einschalthebel der Gegenrolle und der Bandführung
- 7 - Tension Roller
- Tensionmètre
- Tensionmeter
- 8 - Capstan and Pinch Wheel
- Cabestan et contre-cabestan
- Antriebsachse und Gegenrolle
- 9 - Record, Pilot and Playback Heads
- Tête d'enregistrement, tête pilote et tête de lecture
- Aufnahme, Neopilotton- und Wiedergabeköpfe
- 10 - 5" Take-up Reel (7" Reels can also be used with lid open)
- Bobine réceptrice de 13 cm (les bobines de 18 cm peuvent être utilisées avec le couvercle ouvert)
- 13 cm Auffangspule (18 cm Spulen können bei offenem Deckel benutzt werden)
- 11 - Speed and Tape Selector
- Commutateur de vitesse et ruban
- Geschwindigkeits- und Bandumschalter
- 12 - Roller Filter and Strobe Disc
- Filtre de scintillation et stroboscope
- Tonhöfenschwankungsfilter und Stroboskoprolle
- 13 - Erase Head
- Tête d'effacement
- Löschkopf
- 14 - Lid
- Couvercle
- Deckel
- 15 - 5" Supply Reel (7" Reels can also be used with lid open)
- Bobine débitrice de 13 cm (les bobines de 18 cm peuvent être utilisées avec le couvercle ouvert)
- 13 cm Ablaufspule (18 cm Spulen können bei offenem Deckel benutzt werden)
- 16 - Tension Roller
- Tensionmètre
- Tensionmeter
- 17 - Antenna Socket for Receiver
- Prise antenne pour récepteur
- Empfängerantennendose
- 18 - Mike Input no. 1
- Entrée micro no. 1
- Mikrophoneingang no. 1
- 19 - Mike Input no.2
- Entrée micro no. 2
- Mikrophoneingang no. 2
- 20 - Line Input
- Entrée ligne
- Linieneingang
- 21 - Accessory Input
- Entrée accessoire
- Zubehöreingang
- 22 - Mixer Socket
- Prise Mixer
- Mixerdose
- 23 - Loudspeaker Volume
- Volume haut-parleur
- Lautsprecherstärke
- 24 - Rewind and Fast Forward Switch
- Interrupteur de rebobinage et d'avance rapide
- Rückspul- und raschen vorlaufschalter
- 25 - Manual/Automatic Microphone Selector
- Commutateur micro Manuel/Automatique
- Schalter für Mikrophonhandregulierung oder Automatik
- 26 - Headphone Jack
- Prise casque
- Kopfhörerdose
- 27 - Headphone Volume
- Volume casque
- Kopfhörerstärke
- 28 - Meter
- Galvanomètre
- Galvanometer
- 29 - Low Frequency Roll-off Attenuator and Reference Signal Generator Switch
- Commutateur des filtres d'atténuation des basses fréquences et du générateur
- Bassattenuator und Referenzgenerator
- 30 - Meter Switch
- Commutateur du galvanomètre
- Galvanometerschalter
- 31 - Mike 1 Input Level Control
- Potentiomètre d'entrée micro no. 1
- Potentiometer des Mikrophoneingangs no. 1
- 32 - Line Input Level Control and Playback
- Potentiomètre d'entrée ligne et de lecture
- Linieneingang und Wiedergabepotentiometer
- 33 - Mike 2 Input Level Control
- Potentiomètre d'entrée micro no. 2
- Potentiometer des Mikrophoneingangs no. 2
- 34 - Removable Handle
- Poignée amovible
- Abnehmbarer Traghandgriff

NAGRA® IV

TYPE IV D & IV L

SERVICE MANUAL

KUDELSKI S.A. CH 1033 CHESEAUX / LAUSANNE SWITZERLAND

Contents

Front Cover	Guarantee and General View of the Nagra IV	
Section 1	Specifications	3
Section 2	Mechanical Assembly	9
Section 3	Mechanical Adjustments	11
Section 4	Electronic Calibration	35
Section 5	Accessories	111
Appendix 1	Subscription Card for the Nagra News and Service Bulletins	
Back Cover	Sales and Service Organization General Views of the Nagra IV.	

Specifications

The values given below are typical values measured at ambient temperature except where otherwise stated.

Code: No. 1 = minimum characteristic

No. 2 = maximum characteristic

No. 3 = average characteristic on 80 % of the recorders

Dimensions and Weight

- Dimensions of the box alone with cover closed but without knobs, feet, handle or handle mounts 318×222×110 mm
(12.52×8.74×4.33 in)
- Overall dimensions except for the removable handle 333×242×113 mm
(13.11×9.53×4.45 in)
- Thickness of Anticorodal sheet used for the box 2 mm (0.079 in)
- Thickness of the tape deck 3 mm (0.118 in)
- Empty weight i.e. without batteries or tape 5.25 kg
(11 lb 9 oz)
- Weight with ordinary batteries, 5" reels and tape 6.4 kg
(14 lb 2 oz)

Power Supply

Power supply voltage necessary, D.C., positive to the chassis 10.5 to 30 V

- Current consumption in position "Test"
 - 1. 90 mA
 - 2. 100 mA
 - 3. 95 mA
- Current consumption on "Line Playback"
 - 1. 165 mA
 - 2. 185 mA
 - 3. 180 mA
- Current consumption on "Loudspeaker Playback", average level
 - 1. 230 mA
 - 2. 250 mA
 - 3. 250 mA

- Current consumption on "Record"	1. 220 mA
	2. 250 mA
	3. 240 mA
- Current consumption on "Rapid Rewind"	1. 265 mA
	2. 280 mA
	3. 270 mA
- Type of batteries according to CEI standards	R 20
- Ditto according to ASA standards	"D" and L 90
- Approximate length of service with Eveready US 950 batteries used 2 hours/24 hours	18 hours
- Ditto but in continuous service	8.5 hours
- Ditto but Eveready US E 95	32 hours

Magnetic Tape

- Width of tape, nominal	6.25 mm (0.246 in)
- Admissible thicknesses	12 to 50 μ m (0.0005 to 0.0021 in)
- Maximum reel diameter with cover open	178 mm (7 in)
- Duration of recording at 7 1/2"/sec with tape of 35 μ m	45 minutes
- Maximum reel diameter with the cover closed	127 mm (5 in)
- Duration of the recording under the same conditions	22 minutes

Tape Transport

- Switchable tape speeds	15 "/s (38.1 cm/s) 7 1/2 "/s (19.05 cm/s) 3 3/4 "/s (9.525 cm/s)
- Stability of the average speed as a function of temperature within the range admitted for the recorder	1. -0.1 % 2. +0.1 % 3. $\pm$ 0.1 %
- Ditto as a function of the position of the recorder, the degree of filling of the reels, power supply voltage	1. -0.1 % 2. +0.1 % 3. $\pm$ 0.1 %

- Wow and flutter according to DIN 45 507 standard at 15 "/sec
 1. ± 0.03 %
 2. ± 0.05 %
 3. ± 0.05 %

- Ditto at 7 1/2 "/sec
 1. ± 0.05 %
 2. ± 0.08 %
 3. ± 0.07 %

- Ditto at 3 3/4 "/sec
 1. ± 0.06 %
 2. ± 0.12 %
 3. ± 0.11 %

Amplifier Chain

- Values for the Nagra IV D fitted with microphone preamplifiers type QPSE-200-XOYO
- Overall frequency response from 30 to 20,000 Hz, input 200 Ω . Line output unloaded
 1. ± 0.5 db
 2. ± 1 db
 3. ± 1 db
- Total distortion at a level of 0 db, Input 10 mV. Output load 600 Ω
 1. < 0.3 %
 2. $H_2 < 0.3$ %
 3. $H_3 < 0.1$ %
- Maximum input voltage for a distortion of 1 % at 1 kHz

40 mV
- Noise level of microphone preamplifier ASA "A" filter, ref, 1 mW
 1. 125.5 dbm
 2. 127 dbm
 3. 126 dbm

Modulometer

- Integration time for 1 db
 1. 1.5 ms
 2. 3.3 ms
 3. -
- Usable scale

-30 to +5 db
- Response curve from 40 to 10,000 Hz

± 0.25 db
- Ditto from 20 to 20,000 Hz
 1. ± 1.7 db
 2. ± 2 db
 3. ± 2 db

Erasing

- Residue level of 800 Hz signal recorded at maximum level, then erased
 1. -87 db
 2. -81 db
 3. -83 db

Recording and Playback

- Frequency Response: playback of standard tape or recording and playback of a Scotch 203 tape recorded at -20 db Speed: 15 "/sec	30-20,000 Hz (± 2 db)
7 1/2 "/sec	30-15,000 Hz (± 2 db)
3 3/4 "/sec	30-10,000 Hz (± 3 db)
- Nominal maximum recording level with reference to 200 mV (standardized value)	+4 db
- 3rd harmonic distortion at 1 kHz at this level (with Scotch tape 102)	1. 0.2 % 2. 0.5 % 3. 0.4 %
- Noise level of playback chain. Motor turning and loaded with dummy tape. Measured with ASA "A" filter Reference: nominal maximum level	1. -86 db 2. -82 db 3. -83 db
- Signal/noise ratio for recording and playback. Scotch tape type 102. Speed 7 1/2 "/sec Ref. nominal maximum level	3. CCIR -67 db NAB -69 db
- Ditto with band-pass filter (20 to 25,000 Hz) and with interfering magnetic field lower than 1 mGauss RMS	-64 db
- Signal/noise ratio with low noise tape type Scotch 203. Filter ASA "A"	3. -70 db

Inputs

Values for a Nagra IV D fitted with 2 preamplifiers type QPSE-200-X0Y0	
- Number of incorporated microphone inputs	2
- Input levels for 200 Ω microphone	0.2 to 43 mV
- Asymmetrical line input, Z = 100 k Ω . Input levels	1. 0.36 to 120 V 2. 0.38 to 120 V 3. 0.37 to 120 V
- Asymmetrical input at the accessory socket. Admissible current	1. 3.6 to 1200 μ A 2. 3.8 to 1200 μ A 3. 3.7 to 1200 μ A
- Mixer input. Fixed level for 200 mV on the tape. Input impedance Z = 9 k Ω	560 mV
- Pilot input (Nagra IV L) Z = 5 k Ω	0.5 to 25 V

Automatic Level control (ALC)

- Input levels for recording at nominal level
 - 1. 0.5 to 15 mV
 - 2. 0.68 to 17.5 mV
 - 3. 0.6 to 16 mV
- Average distortion within this range 1 kHz. 3rd harmonic
 - 1. 0.15 %
 - 2. 0.4 %
 - 3. 0.34 %
- Frequency response 55 to 16,000 Hz
 - 1. ± 1.5 db
 - 2. ± 2 db
 - 3. ± 1.7 db

Low Frequency Roll-off Attenuator and Reference Generator

- No. of positions of Low Frequency Roll-off Attenuator 4
- Roll-off attenuation at 50 Hz
 - position 1. -5 db
 - position 2. -8 db
 - position 3. -11 db
 - position 4. -17 db
- Cut-off frequency at -3 db
 - position 1. 450 Hz
 - position 2. 450 Hz
 - position 3. 430 Hz
 - position 4. 340 Hz
- Frequency of incorporated reference generator
 - 1. 320 Hz
 - 2. 480 Hz
 - 3. 400 Hz
- Level of reference signal -8 db = 0 v.u.

Outputs

- Level of line amplifier output by 600 Ω for 0 db on the modulometer 3. 4.4 V
- Internal output impedance
 - 30 Hz Z = 90 Ω
 - 50 Hz Z = 42 Ω
 - 1 kHz Z = 18 Ω
 - 15 kHz Z = 24 Ω
- Maximum output voltage into 600 Ω for 1 % distortion. 1000 Hz
 - 5000 Hz 3. 12 V
 - 50 Hz 3. 12 V
 - 30 Hz 3. 12 V
 - 30 Hz 3. 10 V

– Headphone output unloaded. Maximum level	1. 950 mV
	2. 1100 mV
	3. 1000 mV
– Headphone output loaded (headphones 50 Ω). Adjustable voltage	3. 20 to 960 mV
– Output from the mixer socket. Load 100 k Ω , level 0 db	560 mV
– Output of the playback pilot signal with QSLI (Nagra IV L)	1.3 V
– Ditto without QSLI (Nagra IV L)	350 mV

Incorporated Loudspeaker

– Electrical power input to loudspeaker (Nagra powered by ATN)	1.6 W
– Acoustical response curve at ± 6 db	200 to 15,000 Hz

Temperature, Position etc...

– Operating temperatures with special belts and external power supply	–55° to +71°C (–67° to +160°F)
– Ditto with normal belts and manganese batteries	–20° to +71°C (–4° to +160°F)
– Operating positions	all
– Vibration, shock: conforming to aeronautical standard no. RTCA SC 90 cat. F	

Mechanical Assembly

1. General

The position and order of assembly of the pieces are shown on the Mechanical Assembly drawings. Points requiring further detail are dealt with separately.
Esso Beacon 325 Grease should be used on all aluminium to aluminium contacts.

2. Chassis Assembly (see fig. M 2)

Gasket No. 2 should be fixed in position by means of an epoxy adhesive (Araldite 109, 2 component system).
The use of Esso Beacon 325 Grease on Spring No. 36 suppresses any noise.

3. Brake Assembly (see fig. M 3)

Esso Beacon 325 Grease, is used to protect the non-anodized surface of the interior of Bearing Housing No. 5. It should also be used on the thread of Adjusting Screw No. 9 and the spindle hole of Support No. 20. Esso Univis P 38 Oil should be used for Washer No. 23, Journal Bearing No. 22, Tension Roller Spindle No. 21, and sparingly for the felt of Brake Support No. 20.
Swing Arm No. 17 should have 0.3 mm of vertical play on Support No. 20.

4. Clutch Assembly (see fig. M 4)

The untreated surface of Bearing Housing No. 5 should be protected with Esso Beacon 325 Grease. The same grease should also be used for Bearing Ball No. 22, the thread of Adjusting Screw No. 13 and the spindle hole of Support No. 23.
Esso Univis P 38 Oil should be used for Washer No. 26, Journal Bearing No. 25 and Tension Roller Spindle No. 24.
Swing Arm No. 20 should have 0.3 mm of vertical play in Support No. 23.
N.B. The Clutch Pulley No. 12 is fitted with a stainless steel washer which is attached to the inside, by means of an adhesive.

5. Tape Deck Assembly (see fig. M 5)

The Insulating Plate No. 27 is fixed to Shield Plate No. 34 by means of Eastman Adhesive. Grease the sliding surface of Slide Bar No. 18 with Esso Beacon 325 to ensure a smooth action. Nut No. 59 should be locked with Loctite. The heads of the Female Contacts No. 30 should be free in their insulator No. 29. The Record and Playback Azimuth Adjusters are identical (thickness: 1.2, 1.3, 1.4mm). The Pilot Head Centring Adjuster is different.

6. Motor Assembly (see fig. M 6)

The end of the Motor Spindle Assembly (which is fixed in Bracket No. 7) should be oiled with Esso Univis P 38. The special Motor Screw No. 19 should be lightly tightened, the special Motor Nut No. 20 should be locked, then Screw No. 19 should be locked.

7. Control Lever Assembly (see fig. M 7)

The Mobile Guide Spring No. 30 and the Locking Cam No. 18 should be greased with Esso Beacon 325. Washer No. 7, Bearing No. 8 and Spindle No. 11 should be oiled with Esso Univis P 38.
N.B. The Tension Pulleys (M 3, No. 24), (M 4, No. 27) and the Stroboscope Roller (M 7, No. 6) should turn freely.
– Advance of Mobile Guide (M 7, No. 10) and Stroboscope Roller (M 7, No. 6): Adjustment made by the Eccentric (M 7, No. 14).
– Rewinding: Switching point of Microswitch (M 5, No. 38). Adjustment of Micro-switch position by slackening Nuts (M 5, No. 59). The nuts should be locked with Loctite.

8. Pinch Wheel Assembly (see fig. M 8)

The Segment Spindle No. 11 and the Pinch Wheel Pressure Spring No. 15 should be greased with Esso Beacon 325. The Upper Bearing No. 8 should be fixed on the Segment Spindle Support No. 9 by means of Eastman Adhesive. The Support Bearing Screw No. 10 on the base of the Segment Spindle Support No. 9 should be locked with Loctite. The Stop Screw No. 3 is riveted to the Pinch Wheel Support No. 1.
One to three Washers No. 17 should be used to take up the play, which in the position "Stop" should be approximately 0.5 mm between the Pinch Wheel Support No. 1 and the Pinch Wheel Pressure Spring Support No. 6. Ensure that the Allen Screw No. 18 is carefully tightened.

9. Box Assembly (see fig. M 9)

The fixing nuts for Loudspeaker No. 7 should be locked with Loctite. The case Support No. 25 should be greased with Esso Beacon 325. The Rubber Foot No. 28 should be stuck to Rubber Foot Support No. 27 by means of an epoxy adhesive (Araldite 109, 2 component).

10. Box Assembly (see fig. M 10)

11. Battery Box Assembly (see fig. M 11)

Abstracts of the 1950s

Mechanical Adjustments

1. Pinch Wheel Pressure

Set the Nagra to the position "Playback", and the speed to 7 1/2"/sec. Check that there is a full 5" tape reel, and that the tape is running correctly. By means of the Pressure Screw (fig. I. 1 and M 8, No. 7) adjust the pressure so that the dynamometer reads 1000 gr $\pm$ 50 gr. at the moment that the tape stops running.

2. Tachometric Signal Voltage

Set the Nagra to the position "Playback", and the speed to 3 3/4"/sec, with the Pinch Wheel closed. Connect an RMS voltmeter to terminals 1 and 2 (fig. E 34 and E 34.1) of the speed stabilizer. Slightly slacken the fixing screw of the Tachometric Head (M 6, No. 33). With the aid of the two Eccentrics (M 6, No. 11), adjust the head position so that the signal voltage is between 10 and 15 mV at 1 kHz. Check the voltage at the other speeds:

7 1/2"/sec	15 to 25 mV at 2 kHz
15"/sec	approximately 25 mV at 4 kHz

Retighten Screw No. 33.

3. Tachometric Signal Crosstalk on Playback

Set the Nagra to the position "Playback" with the "Line and Phones" switch on "Tape". Stop the tape transport by opening the pinch wheel slightly. Check that all potentiometers are in the anti-clockwise position. Connect an RMS (1/3 octave filter) voltmeter to the Line output. Position the Tachometric head in relation to the wheel so as to have an acceptable crosstalk level, whilst maintaining the fixed values of tachometric signal level.

Tolerances:	15"/sec	0.2 mV/4 kHz
	7 1/2"/sec	0.2 mV/2 kHz
	3 3/4"/sec	0.3 mV/1 kHz

4. Clutch Tape Tension Adjustment

Set the Nagra to the position "Stop". Disengage the Link (M 4, No. 17) from the Clutch Spindle (M 4, No. 14). Fix the tape deck Chassis in a vertical position and put a full 5" tape reel on the right hand reel holder (M 4, No. 2). Prevent the reel from turning. Fix the 20 gr (11 1/4 drams), weight in position, and adjust the Tension Adjusting Screw No. 18 until the Tension Roller (M 4, No. 27) is in the centre of its arc (fig. I. 2). Re-engage the Link (M 4, No. 17).

5. Clutch and Brake Geometry

Set the Nagra to the position "Playback", and the speed to 7 1/2"/sec. Place a 7" reel with tape to 112 mm (4 3/8") diameter on it, and check that the tape is running.

Clutch: Adjust Screw (M 4, No. 13) so that the Tension Roller No. 27 is in the centre of its arc.

Brake: Adjust Screw (M 3, No. 9) so that the Tension Roller No. 24 is in the centre of its arc.

6. Tape Tension, Clutch and Brake

Set the Nagra to the position "Playback", and the speed to 7 1/2"/sec, with the Pinch Wheel closed.

Clutch: Place a full 5" reel in position, and by means of Stop Nut (M 4, No. 15), adjust the tension on a tape withdrawn tangentially to approximately 40 grs (1 oz 6 1/2 drams). Pass the tape round the tension roller and check the following tensions:

5" tape reel empty	25 grs (14 drams)
7" tape reel full	approx. 20 grs (11 1/4 drams)
	(see I. 3 and I. 3')

Brake: Place a full 5" reel in position, and by means of Stop Nut (M 3, No. 12), and Tension Adjusting Screw (M 3, No. 14), adjust the tape tension to approx. 55 grs (1 oz 15 drams).

Recheck the geometry, and if necessary re-adjust according to paragraphs 5 and 6, in the correct order.

7. Tape Transport

Set the Nagra to the position "Playback" and the speed to 7 1/2"/sec. Adjust the height of the Brake Tension Roller (M 4, No. 24), so that the tape enters the Mobile Guide (M 7, No. 10) smoothly. Check that the tape is correctly positioned in the fixed guides (M 5, No. 9), and adjust the height of the Clutch Tension Roller (M 4, No. 27) so that the tape winds into the middle of the reel (fig. I. 4).

8. Tape Start and Stop

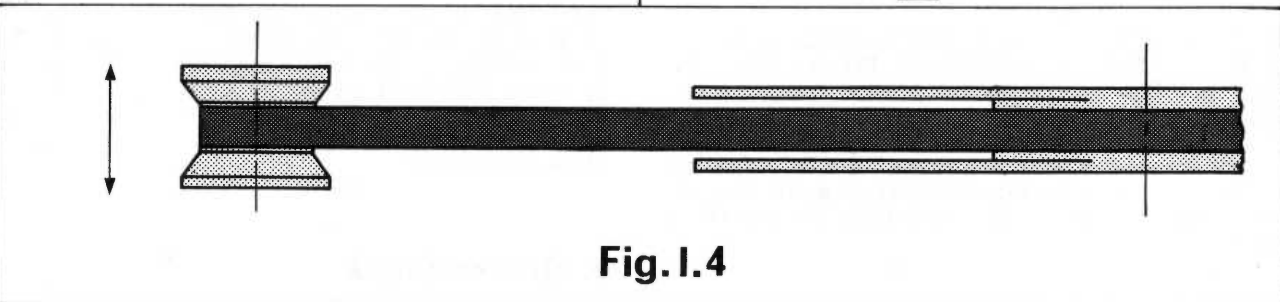
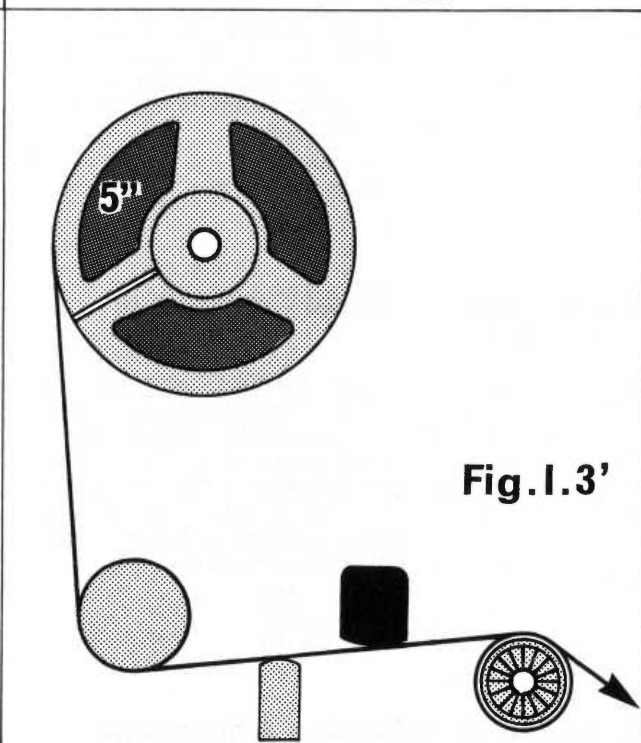
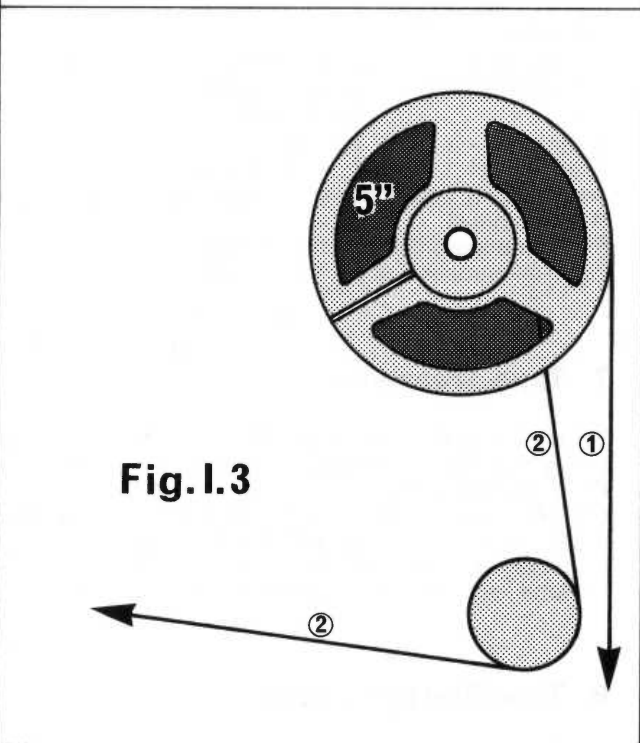
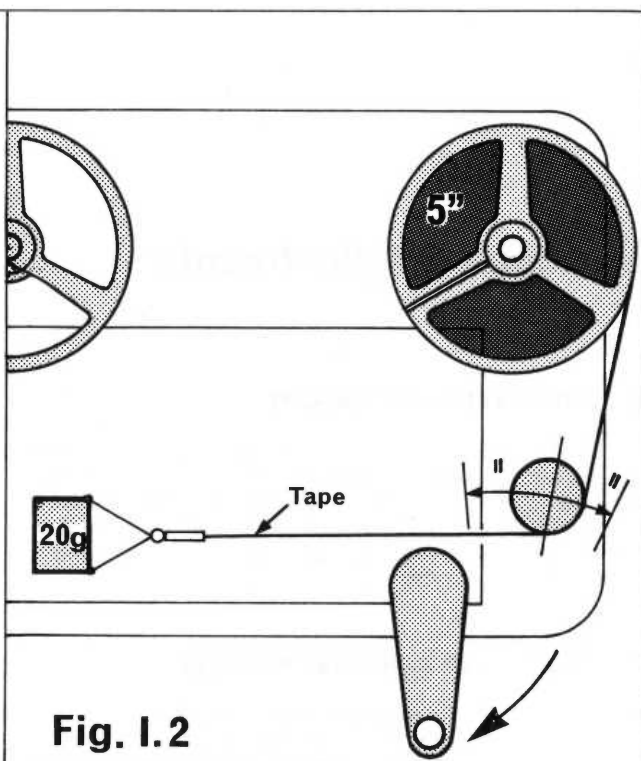
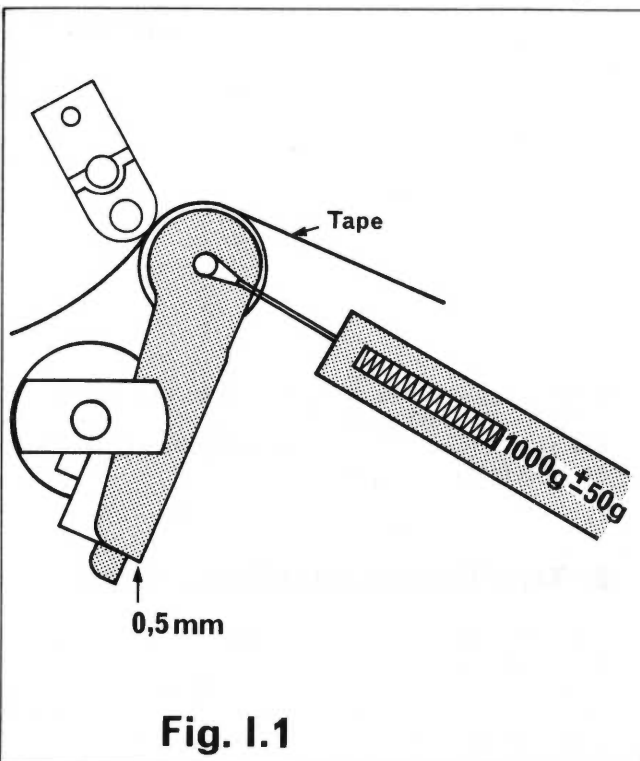
Set the Nagra to the position "Playback", and the speed to 15"/sec. Place a full 7" reel on the left hand reel holder. Check that the tape stops when the pinch wheel is opened by means of the Control Lever (M 7, No. 24). Transfer the full reel to the right hand reel holder. Check that the tape winds correctly when the pinch wheel is closed by means of the control lever.

9. General Check

Azimuth of Playback and Record heads: Check that the tape is well centred on the heads.

Centring of Pilot Head: The pilot head should be perfectly perpendicular to the tape deck.

Wow, Flutter and Speed check (see Electronic Calibration).



MECHANICAL PART LIST

1. Assembly Diagram	Fig. M 1
2. Cover and Tape Deck Chassis	Fig. M 2
3. Brake Assembly	Fig. M 3
4. Clutch Assembly	Fig. M 4
5. Tape Deck Assembly	Fig. M 5
6. Motor Assembly	Fig. M 6
7. Control Lever Assembly	Fig. M 7
8. Pinch Wheel Assembly	Fig. M 8
9. Box Assembly with Handle	Fig. M 9
10. Box	Fig. M 10
11. Battery Box Assembly	Fig. M 11



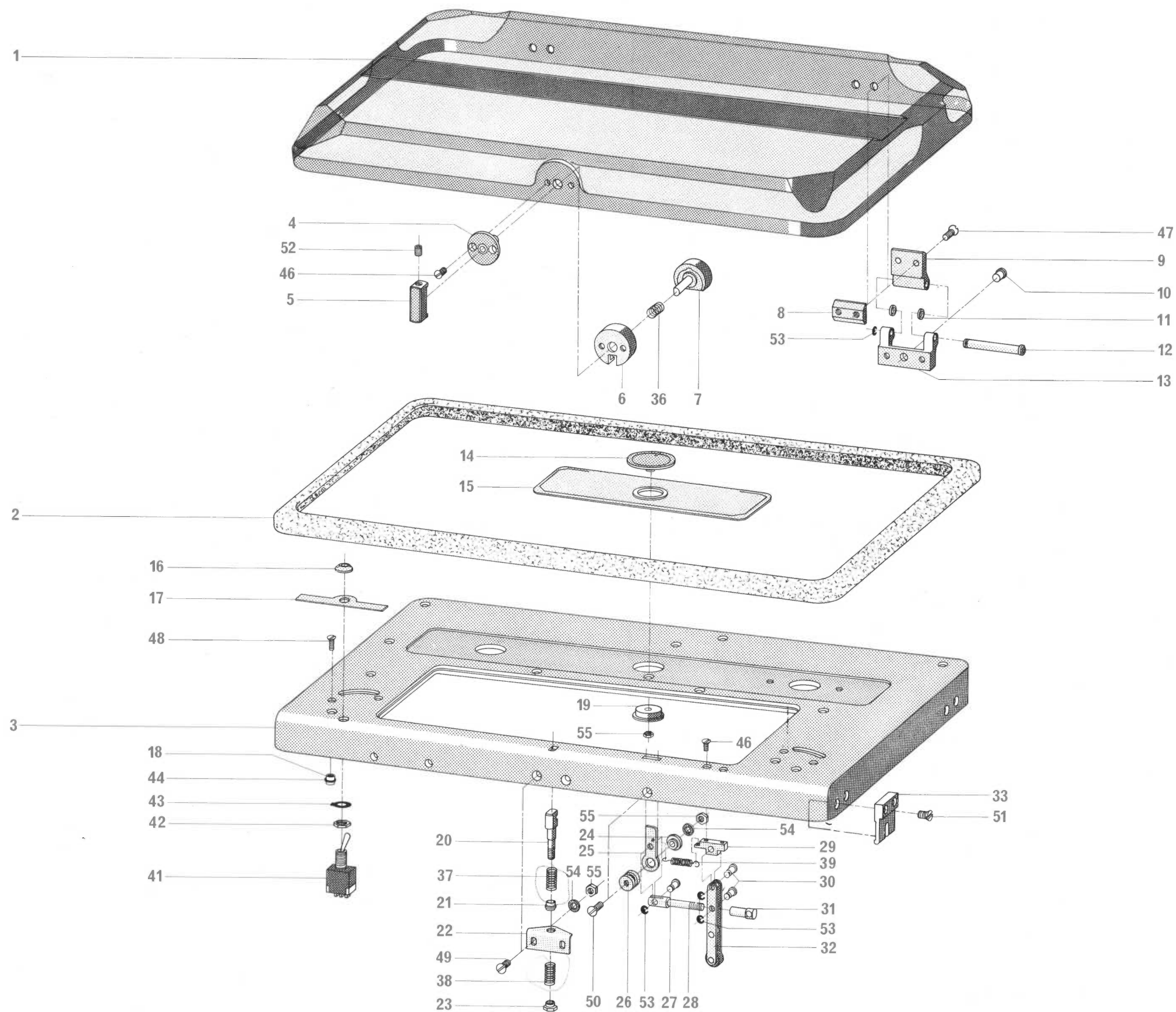
COVER AND TAPE DECK CHASSIS

Figure M 2

1	01.04.490.0.01	Cover
2	01.04.115.0.02	Gasket
3	01.04.115.0.01	Tape Deck Chassis
4	01.04.490.0.02	Bearing
5	01.04.490.0.04	Knob
6	01.04.490.0.03	Positioning Guide
7	01.04.492.0.00	Catch Cam
8	01.04.001.0.04	Tapped Hinge Support
9	01.04.495.0.02	Mobile Half Hinge
10	01.04.495.0.03	Stop
11	01.04.495.0.05	Spacer Washer
12	01.04.495.0.04	Hinge Pin
13	01.04.495.0.01	Fixed Half Hinge
14	01.04.110.0.34	Plug (Single Speed Only)
15	01.04.110.0.23	Inter-reel Panel
16	01.04.110.0.20	Nihon Switch Nut
17	01.04.110.0.24	Rapid Rewind Panel
18	01.04.110.1.17	Tension Roller Stop
19	01.04.110.0.35	Plug Fixing (Single Speed Only)
20	01.04.117.0.02	Cover Catch
21	01.04.117.0.04	Cover Catch Stop
22	01.04.117.0.01	Cover Catch Bracket
23	01.04.117.0.03	Special Nut
24	01.04.320.0.09	Pinch Wheel Control Lever Pivot
25	01.04.185.0.02	Pinch Wheel Control Lever
26	01.04.110.0.16	Spacer
27	01.04.185.0.09	Pin Lg 7
28	01.04.185.0.03	Connecting Rod Head
29	01.04.185.0.06	Support
30	01.04.186.0.08	Pin Lg 8
31	01.04.185.0.04	Connecting Rod Sleeve
32	01.04.187.0.00	Pinch Wheel Control
33	01.04.110.0.14	Closing Plate
36	01.04.490.0.05	Catch Cam Spring
37	01.04.117.0.06	Cover Catch Spring
38	01.04.117.0.05	Cover Catch Spring
39	01.04.185.0.10	Pinch Wheel Control Lever Spring
41	40.45.702.0.00	Nihon Switch S – 2013
42	_____	Nut for Nihon S – 2013
43	_____	Washer for Nihon S – 2013
44	38.25.000.5.00	« O » Ring P.R.P. 233 – 70
46	30.03.022.5.36	Conical Head Screw M2×5
47	30.03.040.2.36	Conical Head Screw M3×8
48	30.03.022.6.36	Conical Head Screw M2×6
49	30.03.040.0.36	Conical Head Screw M3×5
50	30.03.040.4.36	Conical Head Screw M3×12
51	30.03.040.1.36	Conical Head Screw M3×6
52	30.21.039.9.27	Allen Grub Screw M3×4
53	33.50.001.9.48	Benzing Clip 1.9
54	33.10.003.0.00	Schnorr Washer M3
55	32.01.103.0.36	Hex Nut 0.5 d×M3

STANDARD SUB-ASSEMBLIES

01.04.495.000	Right Hinge (No. 9-10-11-12-13-53)
01.04.496.000	Left Hinge (No. 9-10-11-12-13-53)
01.04.115.000	Tape Deck Chassis (No. 2-3)
01.04.117.000	Cover Catch (No. 20-21-22-23-37-38)
01.04.187.000	Pinch Wheel Control Lever (No. 25-28-31-27-39-53)



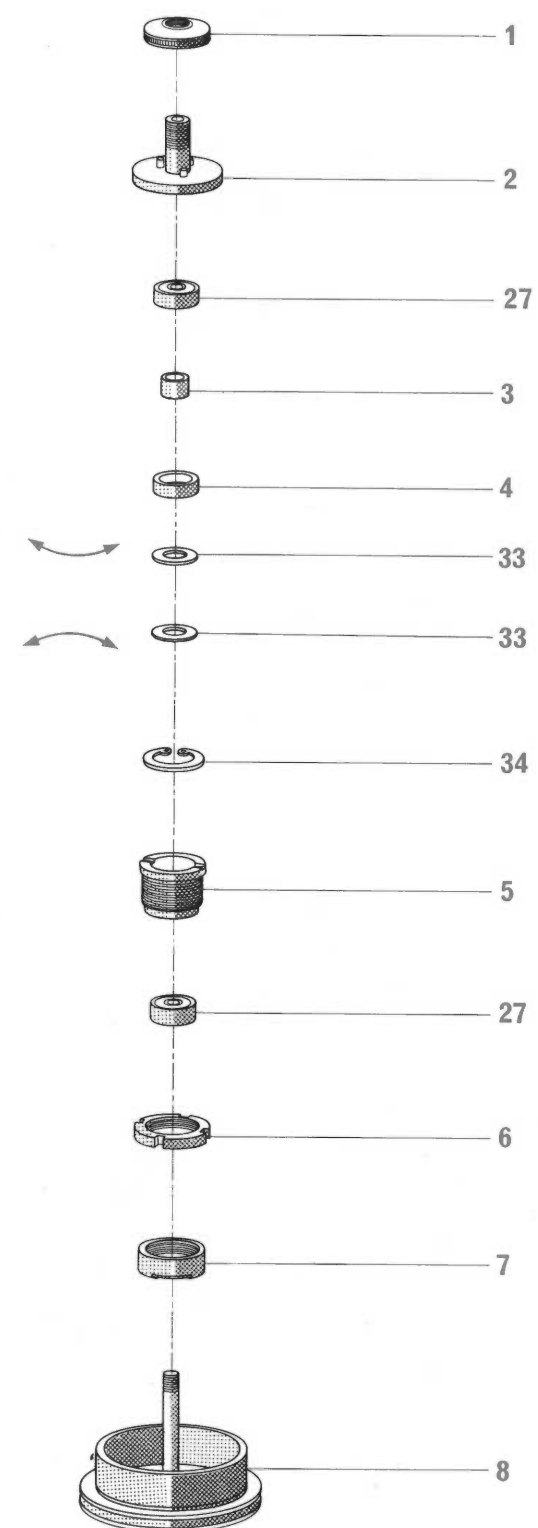
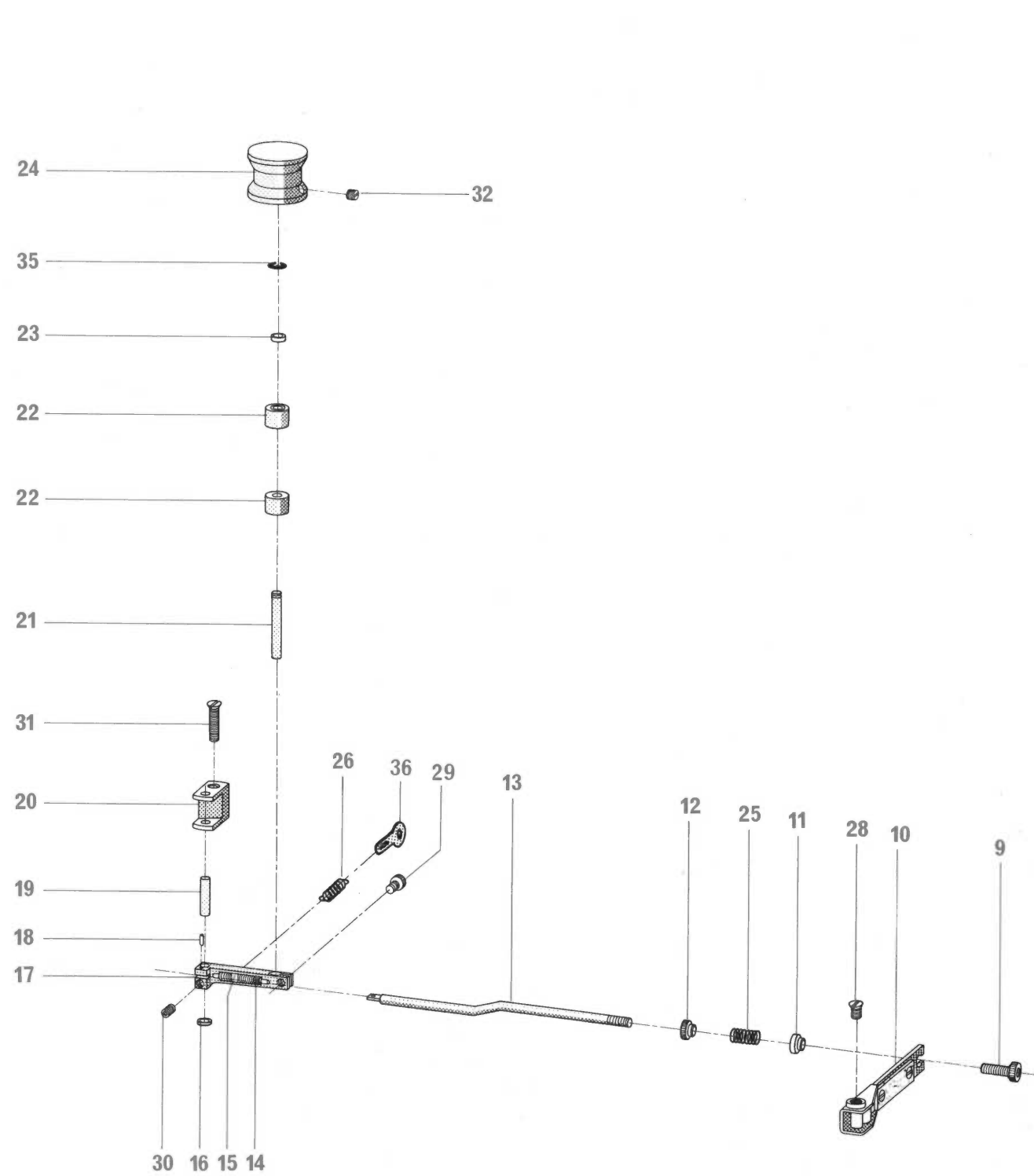
BRAKE ASSEMBLY

Figure M 3

1	01.04.110.0.12	Reel Retaining Nut
2	01.04.125.0.01	Reel Holder
3	01.04.110.0.04	Spacer 7.5 ∅
4	01.04.110.0.03	Spacer 15.9 ∅
5	01.04.110.0.02	Bearing Housing
6	01.04.110.0.05	Special Nut
7	01.04.110.0.06	Lock Nut
8	01.04.120.0.00	Brake Drum Assembly
9	01.04.131.0.11	Adjusting Screw
10	01.04.135.0.00	Brake Support
11	01.04.131.0.12	Spring Support
12	01.04.131.0.03	Stop Nut
13	01.04.131.0.01	Link
14	01.04.132.0.01	Tension Adjusting Screw
15	01.04.132.0.02	Tension Adjusting Nut
16	01.04.131.0.08	Washer
17	01.04.131.0.06	Swing Arm
18	01.04.131.0.10	Link Pin
19	01.04.131.0.09	Swing Arm Pin
20	01.04.140.0.02	Support
21	01.04.155.0.03	Tension Roller Spindle
22	01.04.155.0.02	Journal Bearing
23	01.04.155.0.04	Washer
24	01.04.155.0.01	Tension Roller
25	01.04.131.0.04	Compression Spring
26	01.04.110.0.33	Tension Spring
27	37.70.262.5.00	Ball Bearing EL 5 ZZ
28	30.03.040.1.36	Conical Head Screw M3×6
29	30.07.040.0.27	Cheese Head Allen Screw M3×5
30	30.21.039.8.27	Allen Grub Screw M3×3
31	30.03.040.6.36	Conical Head Screw M3×15
32	30.20.022.1.36	Allen Grub Screw M2×2 (3)
33	33.12.012.0.00	Peter Washer K EL 5
34	33.53.016.0.48	Benzing Clip 16 ∅
35	33.50.001.9.48	Benzing Clip 1.9 ∅
36	42.66.004.0.00	Emissa Tag 4004 – 0,5

STANDARD SUB-ASSEMBLIES

01.04.155.000	Tension Roller (No. 24-22-21-23-32-35)
01.04.131.000	Swing Arm (No. 13-12-25-17-16-19-18-9-11-14-15-20-29-30)
01.04.220.000	Bearing Housing (No. 5-4-3-6-7-33-34-27)



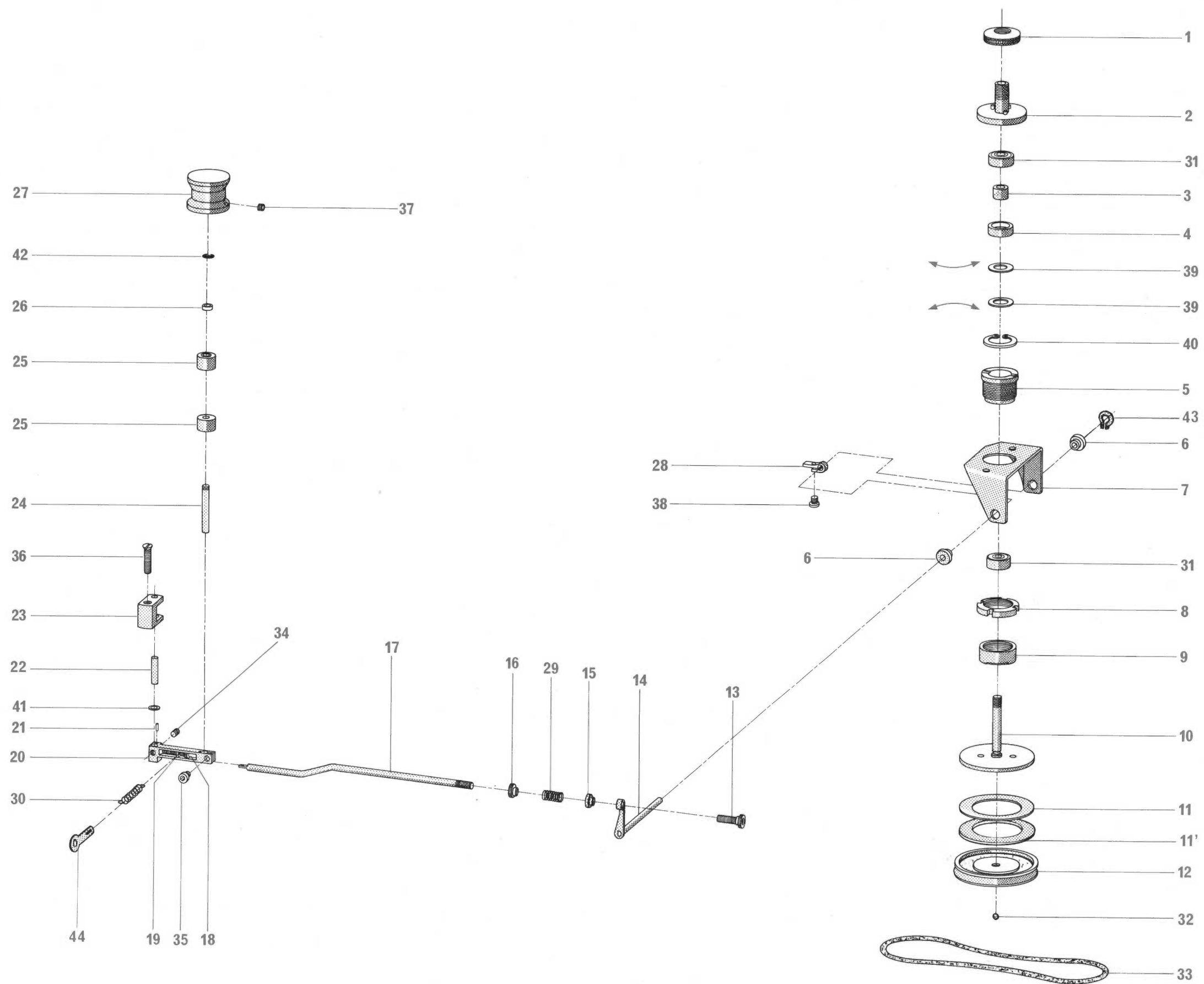
CLUTCH ASSEMBLY

Figure M 4

1	01.04.110.0.12	Reel Retaining Nut
2	01.04.150.0.00	Reel Holder
3	01.04.110.0.04	Spacer 7.5 $\varnothing$
4	01.04.110.0.03	Spacer 15.9 $\varnothing$
5	01.04.110.0.02	Bearing Housing
6	01.04.110.0.11	Clutch Spindle Journal Bearing
7	01.04.110.0.01	Clutch Bracket
8	01.04.110.0.05	Special Nut
9	01.04.110.0.06	Lock Nut
10	01.04.168.1.00	Clutch Pulley Spindle
11	01.04.110.0.37	Flanel Lining
11'	01.04.110.0.36	Satin Lining
12	01.04.165.1.00	Clutch Pulley
13	01.04.131.0.11	Adjusting Screw
14	01.04.161.0.00	Clutch Spindle
15	01.04.131.0.12	Spring Support
16	01.04.131.0.03	Stop Nut
17	01.04.176.0.01	Link
18	01.04.132.0.01	Tension Adjusting Screw
19	01.04.132.0.02	Tension Adjusting Nut
20	01.04.176.0.02	Swing Arm
21	01.04.131.0.10	Link Pin
22	01.04.131.0.09	Pin
23	01.04.170.0.02	Support
24	01.04.155.0.03	Tension Roller Spindle
25	01.04.155.0.02	Journal Bearing
26	01.04.155.0.04	Washer
27	01.04.155.0.01	Tension Roller
28	01.04.110.0.08	Clutch Lever
29	01.04.131.0.04	Compression Spring
30	01.04.110.0.33	Tension Spring
31	37.70.262.5.00	Ball Bearing EL 5 ZZ
32	37.50.002.0.00	Bearing Ball to DIN Standard 5401 d=2
33	38.25.015.4.00	O Ring P.R.P. 154
34	30.21.039.8.27	Allen Grub Screw M3 $\times$ 3
35	30.07.040.0.27	Cheese Head Allen Screw M3 $\times$ 5
36	30.03.040.6.36	Conical Head Screw
37	30.20.022.1.36	Allen Grub Screw M2 $\times$ 2
38	30.01.022.4.36	Cheese Head Screw M2 $\times$ 4 (3)
39	33.12.012.0.00	Peter Washer K EL 5
40	33.53.016.0.48	Benzing Clip 16
41	32.51.026.1.34	Precision Washer 2.6 ID $\times$ 6.0 OD $\times$ 0.1
42	33.50.001.9.48	Benzing Clip 1.9 $\varnothing$
43	35.51.003.0.44	Circlip Sp 220
44	42.65.004.0.00	Emissa Tag 4004 – 45

STANDARD SUB-ASSEMBLIES

01.04.155.000	Tension Roller (No. 27-25-24-26-37-42)
01.04.176.000	Swing Arm (No. 16-29-22-21-13-15-18-19-23-17-20-35-34-41)
01.04.222.000	Bearing Housing (No. 5-4-3-8-9-39-40-31)



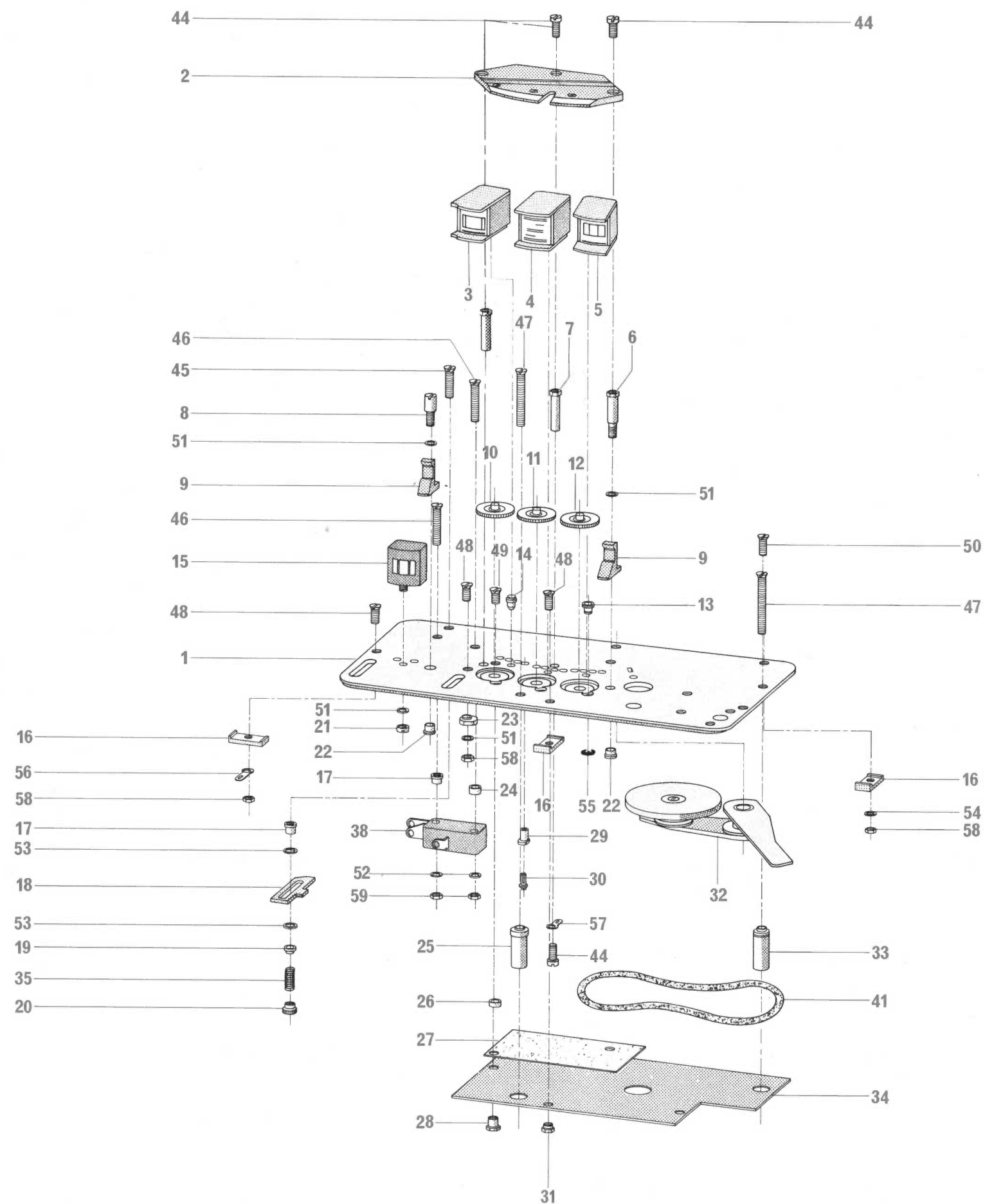
TAPE DECK ASSEMBLY

Figure M 5

1	01.04.265.0.01	Tape Deck
2	01.04.386.0.01	Head Retaining Bridge
3	01.04.340.0.00	Recording Head
4	01.04.360.0.00	Pilot Head
5	01.04.350.0.00	Playback Head
6	01.04.260.0.38	Head Retaining Bridge Extension Screw
7	01.04.260.0.37	Head Retaining Bridge Spacer
8	01.04.260.0.10	Fixing Screw
9	01.04.260.0.19	Fixed Guide
10	01.04.390.0.00	Recording Head Azimuth Adjuster
11	01.04.395.0.00	Pilot Head Centring Adjuster
12	01.04.390.0.00	Playback Head Azimuth Adjuster
13	01.04.260.1.24	Hex Drive Pinion
14	01.04.340.1.05	Pressure Stop
15	01.04.370.0.00	Erase Head
16	01.04.100.0.02	Fixing Strap
17	01.04.260.0.29	Spacer Nut
18	01.04.260.0.32	Slide Bar
19	01.04.260.0.30	Spring Pressure Washer
20	01.04.260.0.31	Spring Control Nut
21	01.04.260.0.04	Erase Head Nut
22	01.04.260.0.28	Special Nut for Fixed Guide
23	01.04.260.0.03	Guide Eccentric
24	01.04.260.0.09	Micro-switch Spacer
25	01.04.260.0.05	Spacer
26	01.04.260.0.40	Spacer
27	01.04.400.0.02	Insulating Plate
28	01.04.260.0.22	Shield Fixing Nut
29	01.04.265.1.03	Head Plug Insulator
30	01.04.260.0.25	Female Contact
31	01.04.260.0.23	Shield Fixing Nut
32	01.04.310.0.00	Rapid Rewind Pulley
33	01.04.260.0.05	Spacer
34	01.04.400.0.01	Shield Plate
35	01.04.117.0.05	Compression Spring
38	40.55.601.0.00	Micro-switch
41	38.25.015.4.00	« O » Ring P.R.P. 154
44	30.01.040.2.36	Cheese Head Screw M3×8
45	30.03.037.1.36	Conical Head Screw M2.6×15
46	30.03.037.4.36	Conical Head Screw M2.6×20
47	30.03.041.3.36	Conical Head Screw M3×30
48	30.03.040.2.36	Conical Head Screw M3×8
49	30.03.036.7.36	Conical Head Screw M2.6×8
50	30.03.040.3.36	Conical Head Screw M3×10
51	33.10.003.0.00	Schnorr Washer for M3
52	33.10.002.6.00	Schnorr Washer for M2.6
53	32.50.011.8.36	Standard Washer 4.3 ID×8 OD×0.5
54	32.50.011.4.36	Standard Washer 3.2 ID×6 OD×0.5
55	33.50.003.2.48	Benzing Clip DIN 6799 di = 3.2
56	42.66.006.0.00	Tag Emissa 4007-0.5
57	42.66.009.0.00	Tag Emissa 4004-0.3
58	32.01.103.0.36	Hex Nut M3×0.5d
59	32.01.002.6.36	Hex Nut M2.6×0.8d

STANDARD SUB-ASSEMBLIES

01.04.400.000 Shield Plate (No. 27-34)



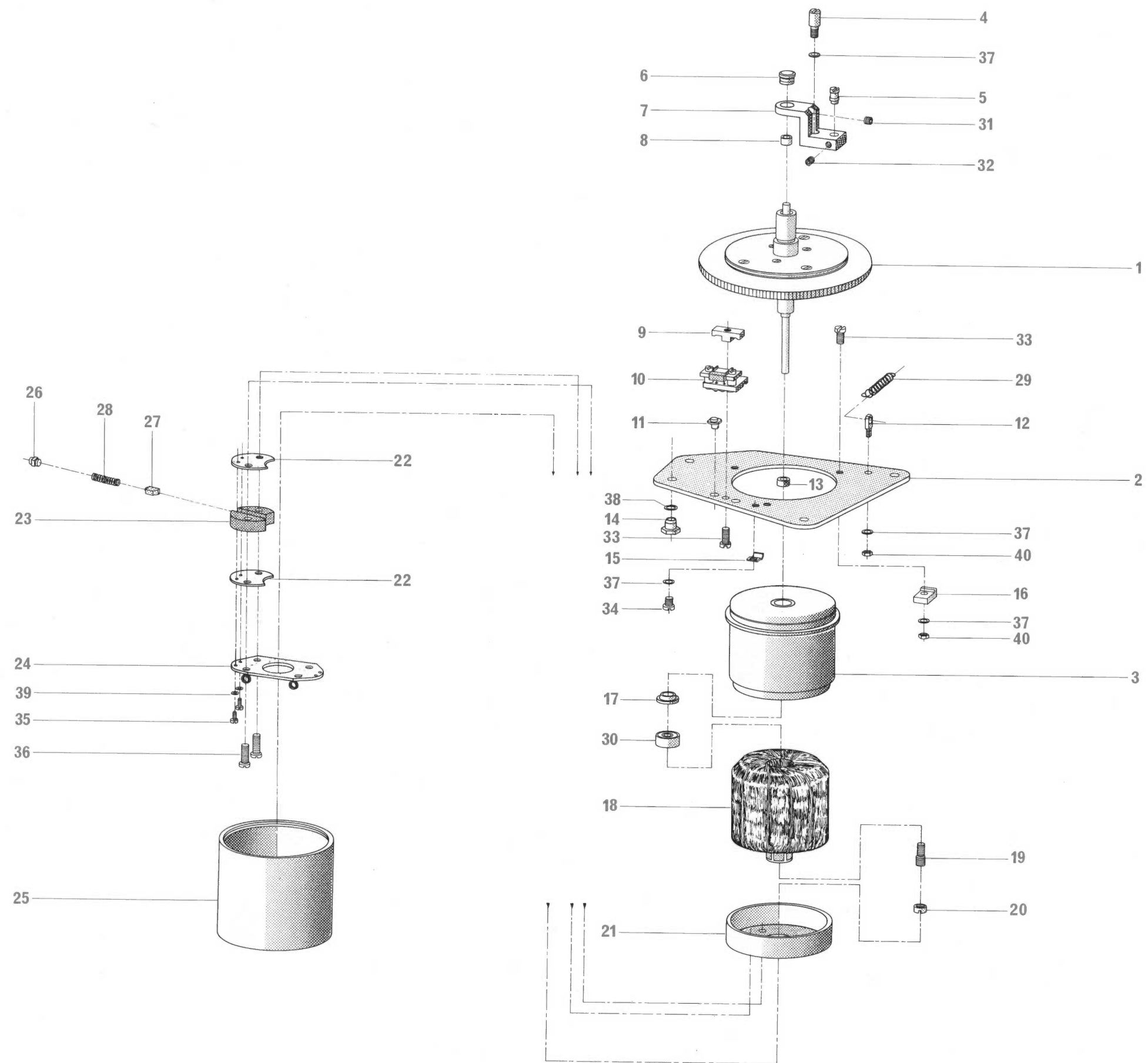
MOTOR ASSEMBLY

Figure M 6

1	01.04.470.0.00	Motor Spindle Assembly
2	01.04.265.1.05	Motor Support
3	01.04.455.0.00	Motor Case
4	01.04.260.0.10	Fixing Screw
5	01.04.270.0.02	Eccentric
6	01.04.270.0.03	Journal Housing
7	01.04.270.0.01	Bracket
8	01.04.270.0.04	Journal Bearing Glissa
9	01.04.260.0.34	Tachometric Head Fixing Nut
10	01.04.381.0.00	Tachometric Head Assembly
11	01.04.260.0.33	Adjusting Eccentric
12	01.04.250.0.05	Rapid Rewind Spring Attachment
13	01.04.250.0.04	Bearing Pressure Ring
14	01.04.250.0.03	Nut
15	01.04.100.0.06	Cable Clip
16	01.04.430.0.02	Fixing Strap
17	01.04.435.0.01	Dust Seal
18	01.04.440.0.00	Rotor Assembly
19	01.04.250.0.01	Special Motor Screw
20	01.04.250.0.02	Special Motor Nut
21	01.04.464.0.00	Circuit Holder Assembly
22	01.04.460.0.05	Carbon Brush Plate
23	01.04.460.0.04	Carbon Brush Holder
24	91.04.462.0.00	Circuit Assembly
25	01.04.480.0.00	Shielding Cap
26	01.04.460.0.03	Spring Mounting
27	01.04.460.0.01	Carbon Brush
28	01.04.460.0.02	Compression Spring
29	01.04.250.0.06	Tension Spring
30	37.70.262.4.00	Ball Bearing EL 4 ZZ
31	30.20.022.1.14	Grub Screw M2×2
32	30.21.039.9.27	Allen Grub Screw M3×4
33	30.01.040.2.36	Cheese Head Screw M3×8
34	30.01.039.9.36	Cheese Head Screw M3×4
35	30.01.008.4.74	Cheese Head Screw M1.4×4
35	31.50.014.0.74	Cheese Head Screw M1.4×7
36	30.01.022.8.74	Cheese Head Screw M2×10
37	33.10.003.0.00	Schnorr Shake Proof Washer M3
38	33.10.005.0.00	Schnorr Shake Proof Washer M5
39	33.21.001.4.82	Spring Washer for M1.4
40	32.01.103.0.36	Hex Nut M3×0.5d

STANDARD SUB-ASSEMBLIES

01.04.430.000	Motor (No. 17-18-3-27-28-26-23-22-24-21-25-35-36-39-30)
01.04.270.000	Bracket (No. 7-5-31-32)
01.04.272.000	Housing (No. 6-8)
01.04.470.000	Motor Spindle (No. 1-19-20)



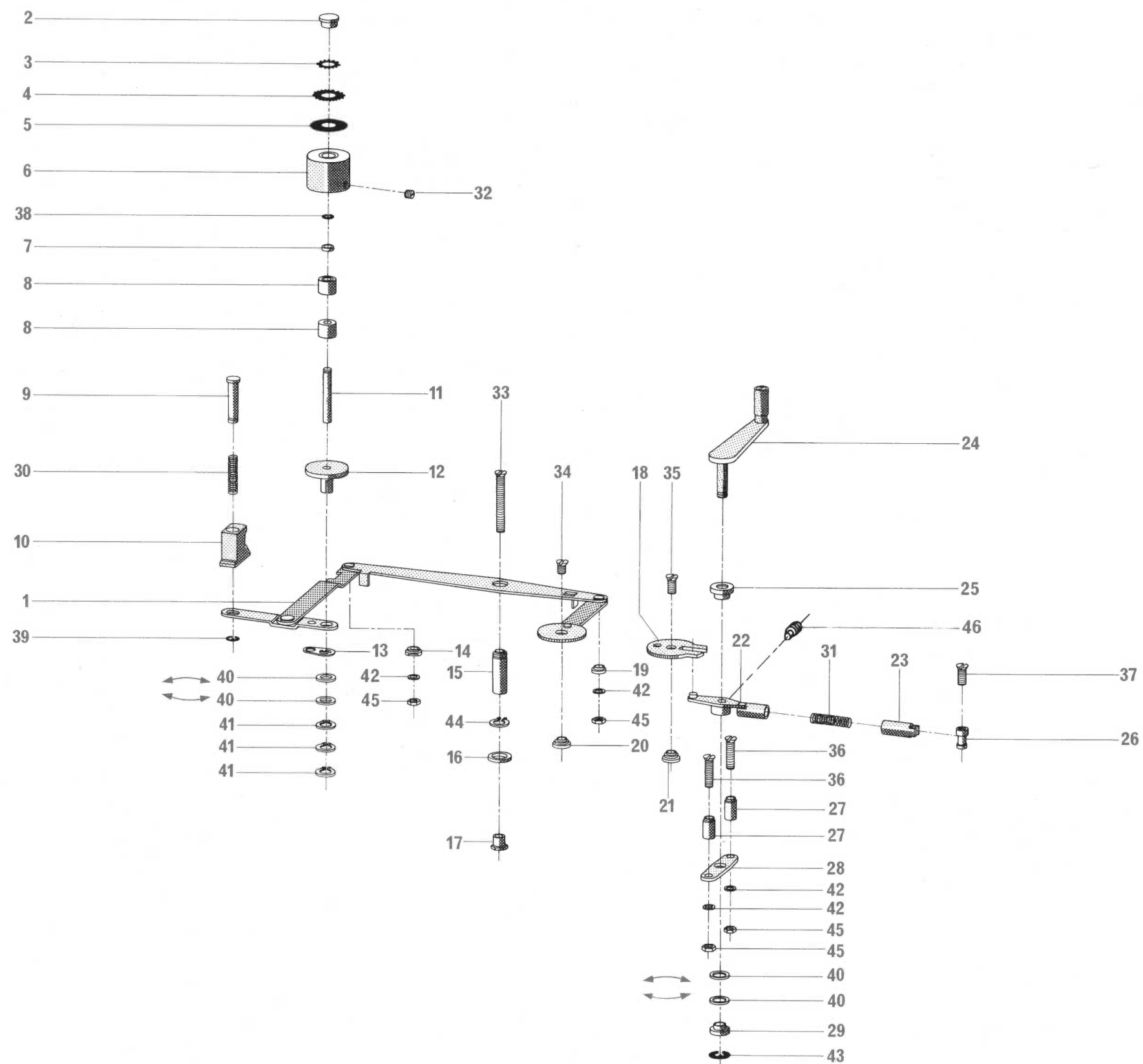
CONTROL LEVER ASSEMBLY

Figure M 7

1	01.04.320.0.00	Bell Crank Assembly
2	01.04.280.0.02	Stroboscope Cap 50 Hz
3	01.04.280.0.03	Stroboscope Ring 50 Hz
4	01.04.280.0.04	Stroboscope Ring 50 Hz
5	01.04.280.0.05	Stroboscope Ring 50 Hz
6	01.04.280.0.01	Stroboscope Roller 50 Hz
7	01.04.155.0.04	Washer
8	01.04.155.0.02	Journal Bearing
9	01.04.260.0.11	Mobile Guide Spindle
10	01.04.275.0.00	Mobile Guide
11	01.04.155.0.03	Stroboscope Spindle 50 Hz
12	01.04.260.0.12	Rotating Guide Base
13	01.04.260.0.35	Stop Plate
14	01.04.320.1.10	Eccentric
15	01.04.260.0.06	Spacer
16	01.04.260.0.13	Rapid Rewind Washer
17	01.04.250.0.03	Nut
18	01.04.260.0.01	Locking Cam
19	01.04.320.0.09	Pivot
20	01.04.260.0.20	Gear Spindle
21	01.04.260.0.17	Locking Cam Pivot
22	01.04.330.0.00	Locking Assembly
23	01.04.100.0.01	Locking Cylinder
24	01.04.325.0.00	Control Lever
25	01.04.256.0.04	Control Spindle Journal
26	01.04.110.0.15	Stop
27	01.04.260.0.07	Locking Spacer
28	01.04.260.0.02	Bearing Bar
29	01.04.260.0.21	Control Lever Journal
30	01.04.260.0.26	Mobile Guide Spring
31	01.04.100.0.03	Locking Cylinder Spring
32	30.20.022.1.36	Grub Screw M 2×2 (3)
33	30.03.041.3.36	Conical Head Screw M3×30
34	30.03.040.0.36	Conical Head Screw M3×5
35	30.03.040.2.36	Conical Head Screw M3×8
36	30.03.040.6.36	Conical Head Screw M3×15
37	30.03.040.3.36	Conical Head Screw M3×10
38	33.50.001.9.48	Benzing Clip DIN 6799 di = 1.9
39	33.50.003.2.48	Benzing Clip DIN 6799 di 3.2
40	33.12.010.0.00	Schnorr Washer K EL 3
41	33.51.006.0.44	Benzing Clip Sp 220 di = 6
42	33.10.003.0.00	Schnorr Washer di = 3.2
43	33.50.004.0.48	Benzing Clip DIN 6799 di = 4
44	33.52.008.0.48	Benzing Clip DIN 471 di = 8
45	32.01.103.0.36	Hex Nut M3×0.5d
46	01.04.330.0.04	Special Screw M4×6

STANDARD SUB-ASSEMBLIES

01.04.280.000	Stroboscope 50 Hz (No. 8-11-7-6-2-3-4-5-32-38)
01.04.285.000	Stroboscope 60 Hz



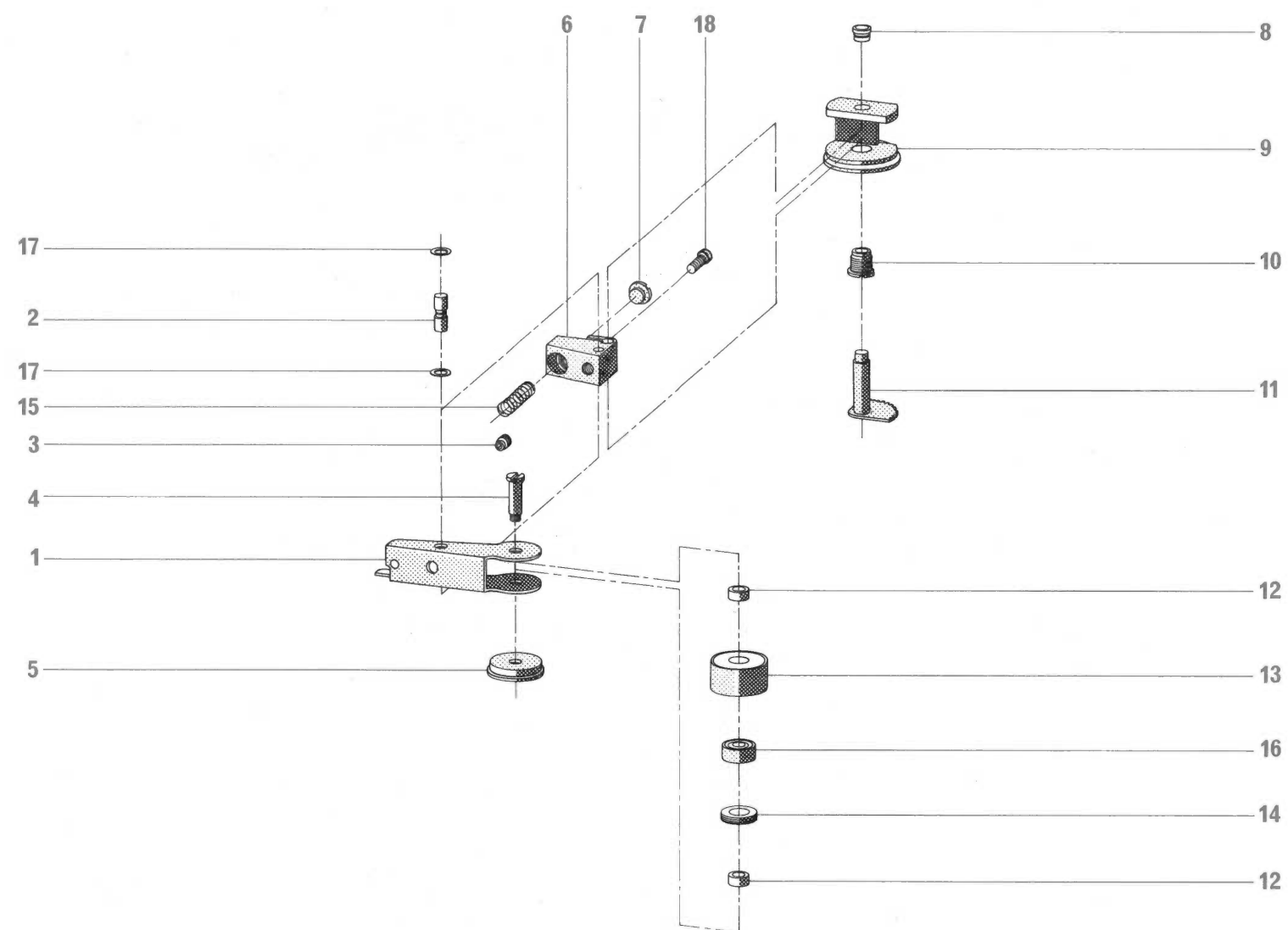
PINCH WHEEL ASSEMBLY

Figure M 8

1	01.04.295.0.01	Pinch Wheel Support
2	01.04.295.0.07	Pinch Wheel Support Spindle
3	01.04.295.0.10	Stop Screw
4	01.04.295.0.02	Pinch Wheel Spindle
5	01.04.295.0.06	Pinch Wheel Spindle Retaining Device
6	01.04.295.0.04	Pinch Wheel Pressure Spring Support
7	01.04.295.0.09	Pressure Screw
8	01.04.290.0.02	Upper Bearing
9	01.04.290.0.01	Segment Spindle Support
10	01.04.260.0.08	Support Bearing Screw
11	01.04.305.0.00	Segment Spindle
12	01.04.295.0.03	Spacer
13	01.04.297.0.00	Pinch Wheel
14	01.04.297.0.03	Pinch Wheel Retaining Screw
15	01.04.295.0.08	Pinch Wheel Pressure Spring
16	37.70.262.4.00	Ball Bearing EL ZZ
17	32.51.042.1.34	Precision Washer 7×4, 2×0.2
18	30.07.040.1.36	Allen Screw M3×6

STANDARD SUB-ASSEMBLIES

01.04.295.000	Pinch Wheel (No. 1-4-12-6-5-2-15-7-13-14-18-3-17)
01.04.290.000	Pinch Wheel Support (No. 9-8)



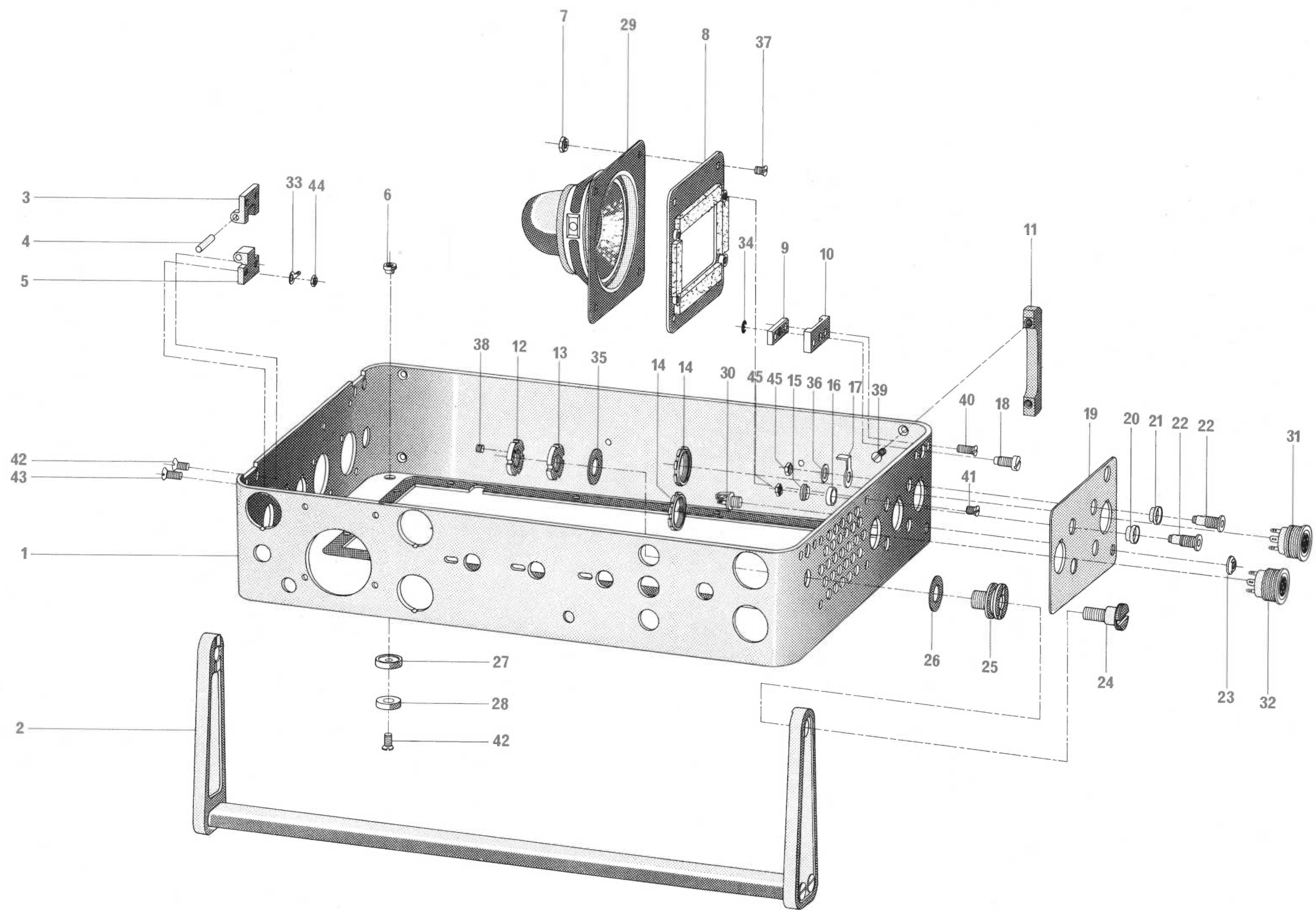
BOX ASSEMBLY

Figure M 9

1	01.04.510.0.15	Box
2	01.04.810.0.00	Handle Assembly
3	01.04.001.0.02	Tape Deck Half Hinge
4	01.04.001.0.03	Hinge Pin
5	01.04.001.0.01	Box Half Hinge
6	01.04.510.0.05	Rivet Nut
7	01.04.600.0.06	Loudspeaker Nut
8	08.04.600.0.00	Loudspeaker Support Assembly
9	01.04.515.1.02	Fastener Plate
10	01.04.515.0.03	Support
11	01.04.510.0.27	Skid
12	01.04.500.0.06	Case Support Lock Nut
13	01.04.500.0.05	Case Support Nut
14	01.04.500.0.12	Nut M18×0.75
15	01.04.510.0.04	Banana Socket Washer
16	01.04.510.0.03	Banana Socket Insulator
17	01.04.510.0.19	Solder Tag Emissa (code 42-66-014-0-00)
18	01.04.515.0.01	Fastener Screw
19	01.04.510.0.33	RHS Panel Symmetrical Output
20	01.04.510.0.02	Banana Socket Insulator
21	01.04.510.0.18	Banana Socket Surround
22	01.04.510.0.01	Banana Socket
23	01.04.510.0.36	Nut ¼" — 32 for Mini-Jack
24	01.04.500.0.02	Case Support Screw
25	01.04.500.0.03	Case Support
26	01.04.500.0.04	Case Support Washer
27	01.04.517.0.01	Rubber Foot Support
28	01.04.517.0.02	Rubber Foot
29		Loudspeaker 15 Ω
30	40.26.602.0.00	Mini-Jack N 41
31	40.24.303.0.00	Tuchel Socket T 3303
32	40.24.305.0.00	Tuchel Socket T 3403
33	42.66.004.0.00	Solder Tag Emissa Special 4004 0.5
34	33.50.002.3.48	Benzing Retaining Clip
35	33.10.020.5.00	Schnorr Original Washer
36	33.10.006.0.00	Schnorr Shake Proof Washer
37	30.03.022.4.36	Conical Head Screw M 2×5
38	30.21.039.8.27	Allen Screw M3×3
39	30.03.040.0.36	Conical Head Screw M3×5
40	30.03.036.8.36	Conical Head Screw M2.6×10
41	30.03.036.5.36	Conical Head Screw M/.6×5
42	30.03.040.1.36	Conical Head Screw M3×6
43	30.03.040.2.36	Conical Head Screw M3×8
44	33.01.103.0.36	Hex Nut M3×0.5d
45	32.30.010.0.65	Hex Nut M3×0.75d

STANDARD SUB-ASSEMBLY

01.04.600.000	Loudspeaker (No. 7-8-29-37)
01.04.515.000	Fastener (No. 18-10-9-34)
01.04.517.000	Foot (No. 27-28)



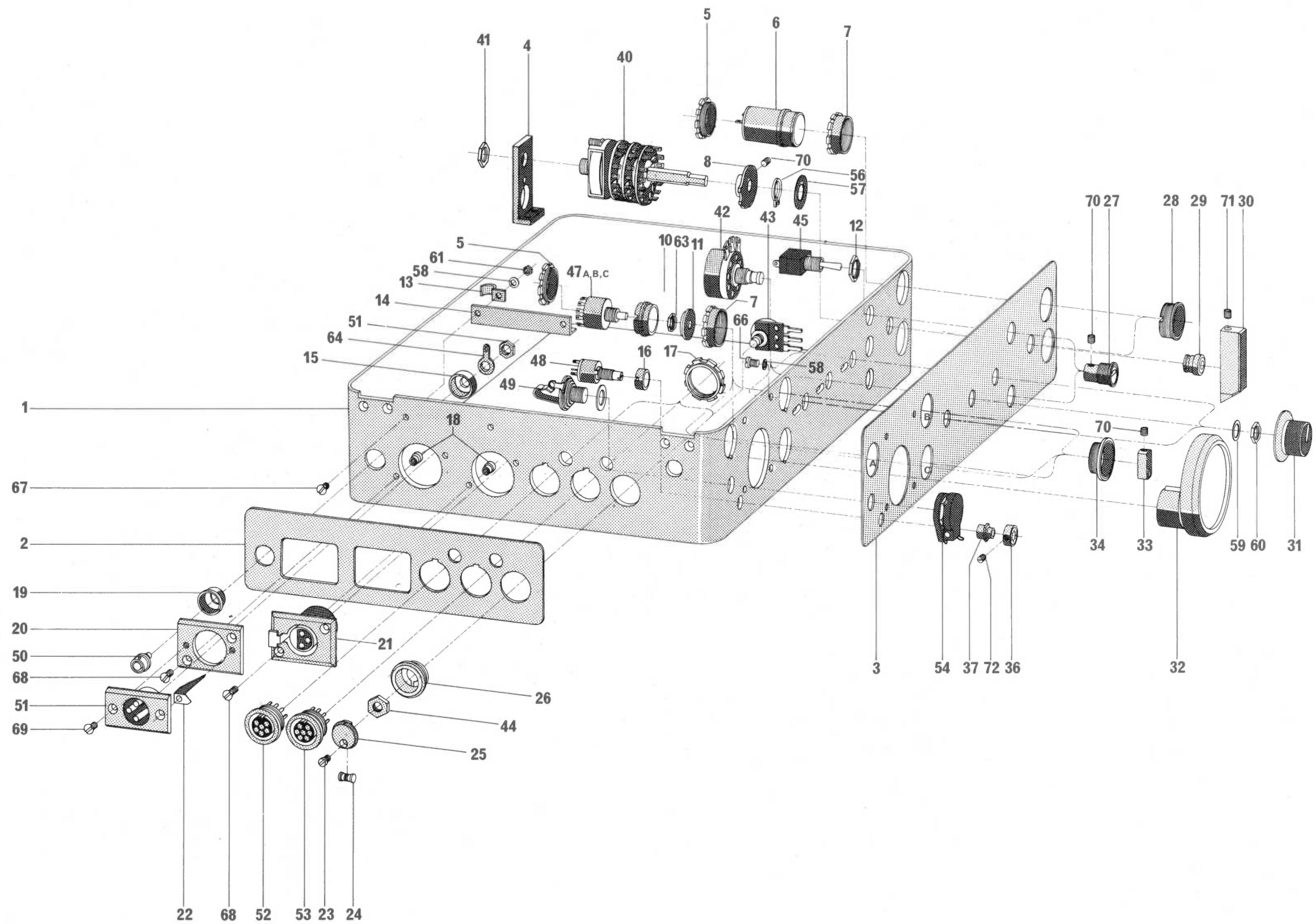
BOX ASSEMBLY

Figure M 10

1	01.04.510.0.15	Box
2	01.04.510.0.32	Left Side Panel
3	01.04.510.0.45	Front Panel
4	01.04.580.0.01	Selector Support
5	01.04.510.0.07	Lock Screw
6	01.04.590.0.00	Indicator Assembly
7	01.04.510.0.06	Fixing Nut
8	01.04.580.1.02	Selector Cam
10	01.04.522.0.01	Elma Switch Support
11	01.04.520.0.01	Elma Switch Disc
12	01.04.510.0.26	Fixing Nut for Nihon Keiheiki Switch
13	01.04.510.0.40	Cable Clip
14	01.04.510.0.34	Grounding Tags
15	01.04.510.0.11	Back Socket Support
16	01.04.510.0.43	Headphone Control Spacer
17	01.04.500.0.12	Nut M18×0.75d
18	01.04.509.0.01	Rivet Nut M3
19	01.04.510.0.10	Front Socket Support
20	01.04.500.0.14	Cannon Plug Support
21	01.04.500.0.13	Modified Cannon Socket
22	01.04.500.0.15	Ground Blade
23	01.04.500.0.19	Locking Screw
24	01.04.500.0.20	Pressure Pin
25	01.04.500.1.08	Loudspeaker Potentiometer Knob
26	01.04.510.0.31	Loudspeaker Potentiometer Knob Support
27	01.04.510.0.24	Nihon Keiheiki Switch Support
28	01.04.510.0.08	Indicator Support
29	01.04.500.0.07	Principal Function Selector Bearing
30	01.04.510.0.09	Principal Function Selector Knob
31	01.04.551.0.00	Knob Assembly
32	01.04.560.0.00	Modulometer Assembly
33	01.04.520.0.02	Elma Switch Knob
34	01.04.525.0.01	Fixing Screw
36	01.04.557.0.00	Scale Support Assembly
37	01.04.510.0.44	Headphone Control Knob Nut
40	40.46.801.0.00	Oak Switch
41		Oak Switch Nut
42	56.26.500.2.53	A.B. Potentiometer
	01.04.510.0.35	
43	56.00.200.2.23	Loudspeaker Potentiometer
	01.04.510.0.39	
44		Loudspeaker Potentiometer Nut
45	40.45.701.0.00	Nihon Keiheiki Switch
47A	40.46.201.0.00	Elma Switch 01-4×3
47B	40.46.203.0.00	Elma Switch 01-1×11
47C	40.46.202.0.00	Elma Switch 01-2×6
48	56.26.500.2.52	A.B. Potentiometer
49	40.26.601.0.00	Masin No. 11 Jack
50	40.24.202.0.00	Suhner Socket EN 021.50
51	40.24.102.0.00	Cannon Plug XRL-3-32
52	40.24.305.0.00	Tuchel Socket Type T-3403
53	40.24.306.0.00	Tuchel Socket Type T-3478
54	43.05.661.0.00	Masin Cover No. 520
56	33.52.010.0.48	Circlip 10 ∅
57	33.12.014.0.00	Spring Washer type K
58	33.10.002.0.00	Schnorr Safety Washer
59	33.24.010.0.00	Shake Proof Washer
60	32.30.020.0.00	A.B. Potentiometer Nut
61	32.01.102.0.36	Hex Nut M2×0.5d
63		Elma Switch Nut
64	42.67.301.0.00	Ludi Solder Tag 514 00
66	30.01.022.6.36	Cheese Head Screw M2×6
67	30.03.022.6.36	Conical Head Screw M2×6
68	30.04.042.0.36	Reduced Conical Head Screw M3×8
69	30.04.040.0.36	Reduced Conical Head Screw M3×5
70	30.21.039.8.27	Allen Grub Screw M3×3
71	30.21.046.9.27	Allen Grub Screw M4×4
72	30.20.022.1.14	Allen Grub Screw M2×2

STANDARD SUB-ASSEMBLIES

81.04.580.000 Main Selector (No. 4-41-40)



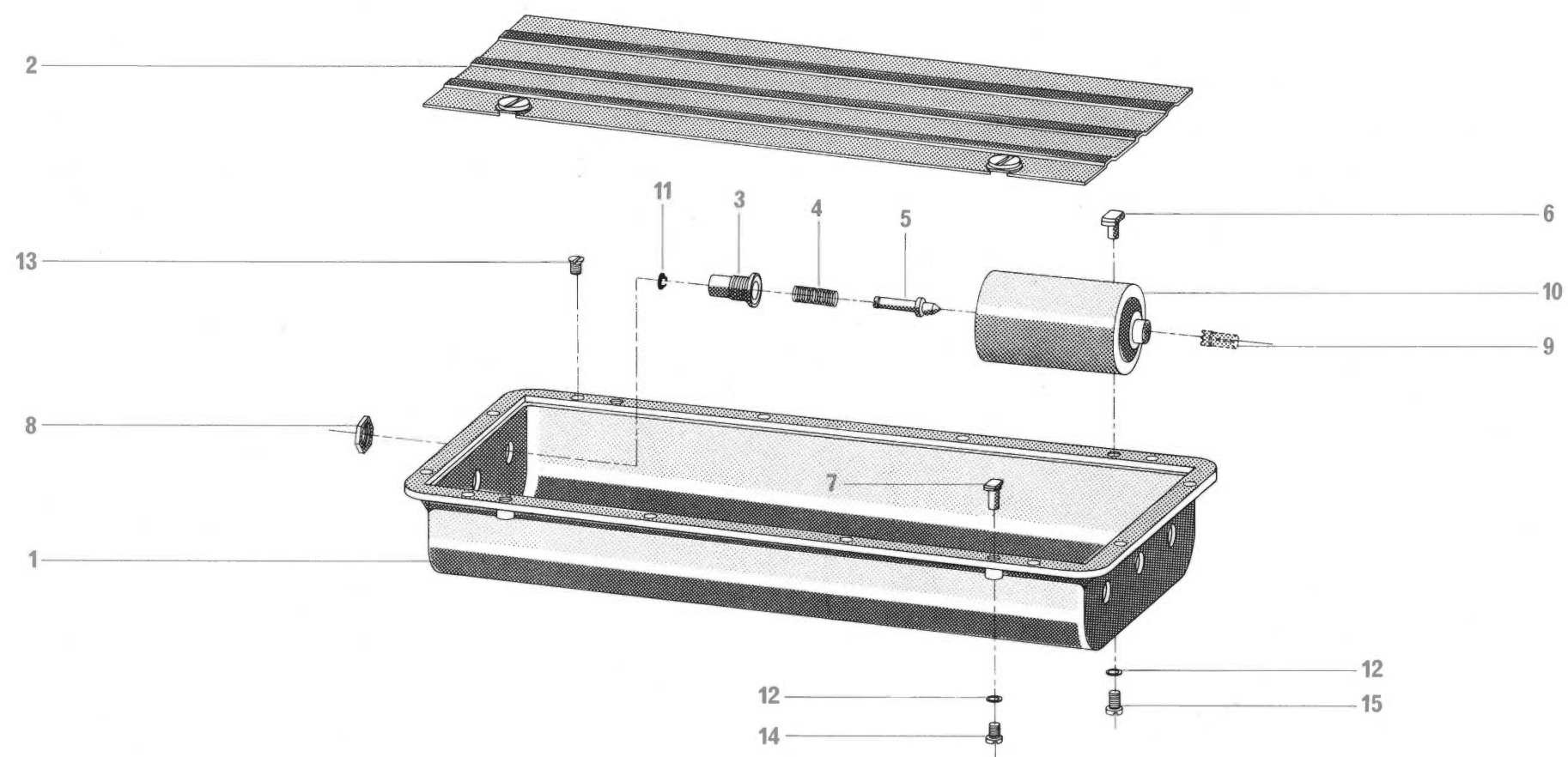
BATTERY BOX ASSEMBLY

Figure M 11

1	01.04.650.0.01	Battery Box
2	01.04.640.0.00	Battery Box Cover
3	01.04.655.0.01	Battery Contact Mounting
4	01.04.655.0.03	Battery Contact Spring
5	01.04.655.0.02	Battery Contact
6	01.04.650.1.03	Battery Box Cover Retainer
7	01.04.650.0.02	Battery Box Cover Catch
8	01.04.655.0.04	Battery Contact Nut
9	01.04.655.0.05	Battery Contact Spacer
10	_____	Battery Cell 1.5 V 30 $\varnothing$ × 60
11	33.50.001.9.48	Benzing Clip di 1.9
12	33.10.002.6.00	Schnorr Shake Proof Washer M2.6
13	30.03.036.5.36	Conical Head Screw M2.6×5
14	30.01.036.5.36	Cheese Head Screw M2.6×5
15	30.01.036.6.36	Cheese Head Screw M2.6×6

STANDARD SUB-ASSEMBLIES

01.04.655.000 Battery Contact (No. 3-5-4-11)



Electronic Calibration

1. Essential Measuring Instruments

- AF Generator 20 Hz-20,000 Hz (e.g. Brüel & Kjaer type 1022)
- Electronic Voltmeter with $\frac{1}{3}$ octave filter analyser (e.g. Brüel & Kjaer type 2112 or 2606 + 1615)
- Oscilloscope
- Universal Voltmeter
- Set of extension boards (available on request)
- ATN Power Supply Unit and Batteries
- Wow and Flutter Meter (WFM)
- Frequency Meter
- Azimuth Adjusting Key No. 01.04.820.000

2. Opening the Recorder

Unscrew the two screws which fasten the tape deck to the box on the right side of the recorder. These screws should be turned in the direction marked "Open" until the tape deck is disengaged. Open the Nagra carefully making sure that the hinge is not strained by the weight of the tape deck. If the transparent plastic tape deck cover is opened, it may be used to support the tape deck when the recorder is open.

3. Voltage Stabilizer

The Nagra should be powered by batteries or by an external Power Supply Unit ATN. Adjust potentiometer R 78 on the voltage and speed stabilizer circuit (fig. E 4 & E 4.1) so that the voltage on terminal No. 15 is -10.0 V DC.

4. Speed Calibration

Connect an electronic voltmeter to terminals 1 and 2 (fig. E 4 and E 4.1).

Adjust the tachometric head (see chap. 3) so as to obtain 10-15 mV RMS/1 kHz at $3\frac{3}{4}$ "/sec.

15-25 mV RMS/2 kHz at $7\frac{1}{2}$ "/sec.

approx. 25 mV RMS/4 kHz at 15"/sec.

- The AR indicator should show a white cross in the "Playback" "SL" and "Record" positions. If this is not so:
 - either the motor is overloaded;
 - or the power supply reserve is insufficient.
- Check the starting of the motor at all speeds in both "Standard" and "Low Noise" tape positions.
- Accelerate the motor intermittently by the "Rapid Advance" switch and check that the normal speed re-establishes itself.
- Check the stroboscope disc speed by placing a neon lamp above it. If necessary, adjust the discriminator coil L 1 (fig. E 4 & E 4.1).

Warning: Variations in mains frequency will show themselves in a similar manner to an incorrect speed. To avoid this effect, it is preferable to feed the neon lamp from a quartz crystal controlled source.

5. Calibration of the "Direct" Chain

Direct Amplifier, Modulometer and Line Amplifier (see Block Diagram—fig. E 1).

a) Calibration of Direct Amplifier and Modulometer Circuit.

The Nagra IV should be put in the position "Test" with the "Line & Phones" switch in the position "Direct", with the "Line and Playback" level control fully clockwise, with the "Meter" switch and the "LF Roll-off Attenuator" switch in the position "Level".

Feed a 1 kHz signal at a level of 0.37 V into the Line Input. Measure the Direct amplifier output signal on the blue wire on the "Line & Phones" switch. Adjust R 8 on the Direct amplifier (fig. E 4 & E 4.2) so that the voltage reads 0.560 V. With no input signal, adjust R 15 on the Modulometer circuit (fig. E 4 & E 4.3) so that the meter needle is over the first division on the scale indicating the level in db. Re-establish the 0.37 V/1 kHz input signal so that the output from the Direct amplifier is 0.560 V. Adjust R 1 on the Modulometer circuit (fig. E 4 & E 4.3) so that the meter reads 0 db. Make an approximate check of the scale and the frequency response of the instrument:

± 2 db from 20-20,000 Hz

± 0.25 db from 40-10,000 Hz.

Disconnect the input signal and put the "LF Roll-off Attenuator" switch into the position "Ref". Adjust R 19 on the Direct amplifier (fig. E 4 & E 4.2) to bring the modulometer needle to the -8 db (0 vu) position. The reference generator is thus calibrated for amplitude. The frequency should be approximately 400 Hz. Check the frequency response of the roll-off attenuators.

b) Calibration of the Line Amplifier Circuit

Load the Line Output by means of a 600 Ω resistor. Put the "LF Roll-off Attenuator" switch into the position "Level" and re-establish the 0.37 V/1kHz signal into the Line Input. Adjust R 1 on the Line amplifier (fig. E 4 & E 4.4) so that the Line Output signal is 4.4 V (0 db).

c) Overall Performance

The overall frequency response should be:

± 0.5 db from 30-20,000 Hz (-1 db at 20 Hz).

With the Line Output loaded by a 600 Ω resistor, the maximum output signal should not be less than 9.3 V RMS at 1 kHz. Distortion at this level second or third harmonic 0.3 % as measured with a $\frac{1}{3}$ octave filter.

The signal-to-noise ratio can be determined by measuring the output level using an ASA "A" filtered voltmeter with no input signal. The voltmeter should read approximately 0.1 mV (approx. 93 db). The maximum output level to the Headphones Jack at 1 kHz should be approx. 900 mV RMS.

d) Calibration of Line Amplifier type II

(From Nagra IV serial No. 2400 onward).

With a 0 db calibrated input signal, check that the output level is 4.4 V into a 600 Ω impedance.

e) Overall Performance with Line Amplifier type II

Frequency response 40 Hz-20 kHz: ± 0.5 db

30 Hz: -1 db

20 Hz: -3 db

The maximum output level at 1 kHz into a 600 Ω load should be 10.5 V RMS, second harmonic level equal to 0.25 %; the third harmonic level should be less than 0.1 % measured with $1/3$ octave level filters. The signal-to-noise ratio measured with an ASA "A" filter should be 93 db.

6. Preamplifiers (see fig. E 4)

All preamplifiers are factory calibrated, but typical characteristics are given for each circuit as follows:

a) QPSE XOYO Dynamic Microphone Preamplifier (fig. E 4.5)

QPSE XOY1.5 Dynamic Microphone Roll-off Preamplifier

Input level: 0.2 mV into 200 Ω to give 0 db Line Output with appropriate level control fully clockwise.

Input level: 0.1 mV into 50 Ω to give 0 db Line Output with appropriate level control fully clockwise.

Frequency response:

QPSE XOYO: 50 Hz-20 kHz ± 0.5 db (-2.5 db at 20 Hz).

QPSE XOY1.5: 100 Hz-20 kHz ± 0.5 db (-1.5 db at 50 Hz & -6 db at 20 Hz).

The distortion, as measured with a $1/3$ octave filter for an input level of 15 mV into 200 Ω , should be as follows:

1 $\rightarrow$ kHz $H_2 = 0.3$ % $H_3 < 0.1$ %

5 $\rightarrow$ kHz $H_2 = 0.3$ % $H_3 < 0.1$ %

31.5 Hz $H_2 = 0.5$ % $H_3 = 0.75$ %

With an input level of 50 mV into 200 Ω , the distortion should be:

1 $\rightarrow$ kHz $H_2 = 0.3$ % $H_3 < 0.1$ %

5 $\rightarrow$ kHz $H_2 = 0.3$ % $H_3 < 0.1$ %

31.5 Hz $H_2 = 2.2$ % $H_3 = 1.2$ %

Noise level measured with an ASA "A" filter: from -126.3 dbm to -127.3 dbm. The rejection of Bias Frequency (120 kHz) may be adjusted by means of the coil L 3. Power consumption: 1.6 mA at 10 V DC.

b) QPSE XnYm - Dynamic Microphone Filtering Preamplifier (fig. E 4.6)

c) QPM 3-5 Preamplifier and Condenser Microphone Power Supply (fig. E 4.7)

(Neumann KM 73, 74 and 76, Sennheiser MKH 105, 405 and 805).

Minimum input level: 2 mV/1kHz for 0 db Nagra.

Frequency response (low frequency attenuator in position 0):

50 Hz-20 kHz: ± 0.5 db

31.5 Hz: -1 db

20 Hz: -3 db

Maximum input level: 200 mV/1 kHz

Distortion at max. level: -1 kHz $H_2 < 0.3$ %

$H_3 < 0.1$ %

-5 kHz $H_2 < 0.5$ %

$H_3 < 0.15$ %

-80 Hz $H_2 = 0.35$ %

$H_3 = 0.2$ %

Noise level: negligible in comparison with that of the microphone.

d) QPM - 6 High Level Line Preamplifier (fig. E 4.8)

Input level: 77 mV to 25 V

Input impedance: 10 k Ω

Frequency response: 50 Hz-20 kHz: ± 1 db

20 Hz: -6 db

35 kHz: -6 db

50 kHz: -18 db

Distortion: at 20 V/1 kHz or 10 kHz: total harmonic distortion < 0.2 %

at 20 V/31.5 Hz: total harmonic distortion < 1.5 %

Common mode rejection at 10 kHz: 70 db

at 125 Hz: 95 db

Signal-to-noise ratio for 250 mV input signal: > 80 db

for 77 mV input signal (level control fully clockwise): 67 db

for input signals > 1.3 V the noise level of the QPM-6 is negligible compared with the rest of the chain.

e) QPSI 200 Ω or 50 Ω -Omnidirectional Dynamic Microphone Preamplifier (fig. E 4.9)

Current feed:

Sensitivity: ± 1 μ A RMS/200 Ω (equivalent to 0.2 mV/200 Ω) for 0 db

± 2 μ A RMS/50 Ω (equivalent to 0.1 mV/50 Ω)

Maximum signal level: 125 μ A/200 Ω (25 mV/200 Ω)

250 μ A/50 Ω (12.5 mV/50 Ω)

Distortion at this level: < 1 %

Frequency response: 30 to 20,000 Hz ± 1 db

Noise level: -126 dbm measured with an ASA "A" filter

f) QPAI 200 Dynamic Microphone Asymmetrical Preamplifier (fig. E 4.10)

Current feed:

Sensitivity: ± 1 μ A RMS/200 Ω for 0 db.

Maximum input signal: 30 mV. Distortion at this level < 0.8 %.

Frequency response: 30 to 20,000 Hz ± 1 db (-1.5 db at 20 Hz)

Noise level: -125.3 dbm measured with an ASA "A" filter

g) QPM 3-4 Preamplifier and Power Supply Unit for Sennheiser (fig. E 4.11)

Condenser microphone MKH 104, 404, 804

Minimum input level for 0 db: 1.5 mV

Frequency response: 20 to 20,000 Hz ± 1 db

Maximum input level: 300 mV

Distortion at this level: < 0.6 %

Noise level negligible compared with that of the microphone

7. L.S. Amplifier (fig. E 4 & E 4.12)

Factory calibrated.

8. Automatic Level Control ALC (fig. E 4 & E 4.13)

Factory calibrated. (Requires special instruments for calibration).

Feed the Microphone Input with a voltage range of 0.6 to 20 mV. An approximate check of the functioning of this circuit may be made by switching the Nagra on to "Automatic Level Control" and putting the meter switch to "Compression". Check that the meter needle reads 0 db compression with a 1 kHz input signal of 0.6 mV ± 0.1 mV, into 200 Ω , at the microphone input. Full scale deflection corresponding to 30 db compression should be reached with an input signal of 18 mV ± 1 mV, into 200 Ω . Throughout this range, the third harmonic distortion should not exceed 0.5 % with a typical figure of 0.25 %.

The frequency response should be within ± 2 db between 55 Hz & 16,000 Hz.

9. Socket Connections, (see Back Cover)

a) Mixer Socket.

Pin. No. 1 = 560 mV fixed input.

Pin. No. 2 = -10 V DC stabilized power supply output.

Pin. No. 3 = 560 mV level "Direct" signal output.

Pin. No. 4 = Unstabilized power supply available even when switched off.

Pin. No. 5 = 560 mV level "Tape" signal output.

Pin. No. 6 = "Stop"—on connecting this pin to the —10 V supply, the motor will stop.

Pin. No. 7 = Chassis.

b) Accessory Socket

Pin. No. 2 = Chassis.

Pin. No. 3 = Current Line Input 3.73 μ A RMS to give 0 db with "Line & Playback" level control fully clockwise.

Pin. No. 6 = —10 V DC stabilized power supply.

c) Power Pack Socket

Pin. No. 1 = Battery negative.

Pin. No. 2 = Chassis & battery positive.

Pin. No. 3 = Pilot playback.

Pin. No. 4 = Speed correction.

Pin. No. 5 = External power supply.

Pin. No. 6 = —10 V DC on "Record".

d) Pilot Socket

Pin. No. 1 = Chassis.

Pin. No. 2 = Input + 8 to 14 V DC automatic clapper.

Pin. No. 3 = Quartz Crystal Controlled Pilot Generator output.

Pin. No. 4 = Pilot input.

10. Calibration of Playback Chain (fig. E 5 & E 5.1, E 5.2.)

Nagra agents can supply a special multifrequency Standard Playback Tape to be used in conjunction with a $\frac{1}{3}$ octave filter analyser for the calibration of the recorders. This tape is recorded at a level of —20 db so as to have 0.5 V RMS at the Line Output terminals with switch SW 4 "Line & Phones" in the position "Tape". This calibration should be done with the recorder open, and with the tape deck fixed in a position whereby it is not subjected to stress. All the level controls should be put into the fully anti-clockwise position and no connection should be made to the Line, Accessory or Mixer inputs. The magnetic heads should be carefully demagnetized and checked to ensure that they are connected to the chassis.

A voltmeter should be connected to the Line Output sockets and the Nagra should be placed in the "Playback" position.

a) Speed 15"/sec:

The playback head should be carefully checked for azimuth using a demagnetized Allen key.

It is then possible to adjust R 2 (fig. E 5.1, E 5.2) for medium frequency level, R 8 for the low frequency level and R 25 for the high frequency level, in that order. R₂ & R₈ should always remain in the same position afterwards.

b) Speed 7½"/sec:

The playback level at the Line Output should be within ± 1 db of 0.5 V RMS. R 24 (fig. E 5.1, E 5.2) may be adjusted for high frequency correction.

c) Speed 3 ¾"/sec:

The playback level at the Line Output should be within ± 3 db of 0.5 V RMS. R 23 (fig. E 5.1, E 5.2) may be adjusted for high frequency correction.

11. Calibration of the Pilot System

The Nagra IV may be calibrated according to two Standards:

– Standard No. 1: 250 mV

– Standard No. 2: 500 mV (as for the Nagra III)

Unless otherwise requested, Standard No. 1 is normally adopted, the pilot level thus being —6 db referred to nominal playback level of 200 mV. Check that the head is connected to the chassis.

a) Level Calibration:

The Nagra should be put into the "Playback" mode at a speed of 7½"/sec. Disable half of the pilot head by removing the bridge "B" on the oscillator and pilot amplifier circuit (fig. E 5., E 5.3). Feed the Pilot Input with a 50 or 60 Hz signal coming from an ATN Power Supply Unit or a Quartz Crystal Controlled Generator and record. Adjust the pilot head azimuth for a maximum playback signal on the Line Output, the "Line & Phones" switch being in the position "Tape". Adjust R 8 (fig. E 6.1) for the best waveform.

Adjust the level by means of R 14 (fig. E 6, E 6.1) on the pilot recording amplifier, so that the signal at the Line Output is 250 mV ± 10 % at 50 or 60 Hz.

b) Pilot - Sound Rejection:

Reconnect bridge "B" on the oscillator circuit (fig. E 5.3) and feed a 50 or 60 Hz signal into the Pilot Input. Observe the signal at the Line Output with the "Line & Phones" switch in the position "Tape", and with one of the Line Output terminals connected to the chassis to avoid interference by induction. With the Nagra in the position "Record" adjust R 8 (fig. E 5.3) for a minimum residual pilot signal which should normally be 4mV ± 1 mV RMS.

c) Pilot Playback Sensitivity:

Record the pilot signal and then play it back with the Principal Function Selector in the position "Playback SL" (the Nagra must be equipped with the QSLI circuit). The Meter Switch should be placed in the position "Pilot Playback".

Adjust R 14 (fig. E 5.3) so that the meter reads 1.1 V on the volts/cell scale (1.3 V for older type scales), this corresponding to 1 V RMS at the Pilot Playback Output on the Power Pack socket.

N.B. For recorders not fitted with the QSLI circuit, the output level should be 250 mV minimum.

Check that the pilot indicator functions for any level greater than 0.6 on the meter scale (Pilot Playback Alarm).

d) Sound - Pilot Rejection:

Play back a tape recorded at nominal level across its whole width at 50 or 60 Hz. By means of R 7 (fig. E 5.3), adjust the Pilot Playback Output signal to a minimum value.

12. Calibration of the Frequency Meter QFM (fig. E 6 & E 6.2)

Feed a 50 or 60 Hz Quartz Crystal Controlled Generator signal into the Pilot Input with the Meter Switch in the position. "Pilot Frequency". Adjust R 19 (fig. E 6.2) so that the meter needle shows exactly 0 %.

13. Calibration of QSLI Circuit (fig. E 6 & E 6.3)

The QSLI is factory calibrated with no variable components. The slaving range should cover speed variations of +3 % to —2 %.

14. Clapper Signal Check

With the "Clapper" pin of the Pilot socket connected to any positive voltage between +8 and +14 V, a 400 Hz rectangular signal at a level of approximately —8 db should be measurable at the Line Output.

15. Recording Calibration

a) Sound Bias:

The Nagra should be placed in the "Record" mode with the "Meter" switch in the position "Bias". Regulate C 12-13 on the oscillator circuit (fig. E 5.3) so that the value indi-

cated on the meter is the same as is shown on the test sheet accompanying each recorder. Adjust the bias frequency to 120 kHz $\pm 1\%$ measured at the collector of N 2 or N 1 by means of C 8 (fig. E 5.3).
N.B. Adjustments of C 12-13 and C 8 are interdependent and any adjustment of one must be followed by an adjustment of the other. The oscillator shielding must be re-assembled.

b) Calibration of Low Distortion Circuit:

An analyser voltmeter and an ordinary voltmeter should be connected to the Line Output. The limiter should be put out of service by short-circuiting the female contact on the recording amplifier (fig. E 5, E 5.4) to the chassis. The Nagra should be put into the 15"/sec "Standard Tape" position and loaded with a Scotch 102 tape or other tape as desired. A 2 V/1 kHz signal should be connected to the Line Input, and with the Principal Function Selector in the position "Test" adjust the "Line and Playback" level control so that the unloaded Line Output signal is 7 V RMS with the "Line & Phones" switch in the position "Direct". Put the "Line & Phones" switch into position "Tape" and put the Nagra into the "Record" mode, and adjust R 1 (fig. E 5.4) so that the Line Output signal is again 7 V RMS. Measure the distortion on the analyser voltmeter:

Second harmonic: Adjust R 26 (fig. E 5.4) for a minimum value (typically 0.3 % with a $\frac{1}{3}$ octave filter).

Reduce the level by means of the "Line and Playback" level control as a check that the distortion also is reduced. Re-establish the 7 V RMS output level (measured with the second voltmeter).

Third harmonic: Adjust R 33 (fig. E 5.4) for a minimum third harmonic level, ensuring simultaneously that the 1 kHz output level remains at 7 V RMS, by adjusting R 1. A typical third harmonic level is 0.45 % measured with a $\frac{1}{3}$ octave filter.

Check the distortion at the other levels as for the second harmonic. Put the "Line & Phones" switch to the position "Direct", adjust the "Line and Playback" level control for a 7 V Line Output level, switch back to "Tape" and adjust definitively R 1 (fig. E 5.4) for an output level of 7 V also.

c) Calibration of the Limiter

Remove the strap short-circuiting the limiter to the chassis, keep the Nagra in the "Record" position on 15"/sec: check the sensitivity of the tape used by ensuring that the output is 0 db in both positions of the "Line & Phones" switch. If it is not, adjust R 1 (fig. E 5.4) and repeat the calibration of the low distortion circuit.

Connect a 1 kHz signal to the Line Input to give 0 db. Connect the voltmeter to Pin 3 of the mixer socket ("Direct" output) and then to Pin No. 5 ("Tape" output). The same level should appear at both terminals-i.e. 560 mV. Increase the signal level to +11 db equivalent to 2 V at 1 kHz on Pin No. 3. Connect the voltmeter to Pin No. 5. and adjust R 49 (fig. E 5.4) to read +5 db = 1 V.

A dynamic control can be made at the Line Output by connecting an oscilloscope. By passing from 0 db to +10 db, the signal should remain clean.

d) Check of the Fading Circuit

With the Nagra in the "Record" mode and the "Line & Phones" switch on "Tape" and with a signal fed into the Line Input to give 0 db at the Line Output, an attenuation of 30 db should be introduced by changing the Principal Function Selector from "Record" to "Fading". By passing from "Fading" to "Record", the level should re-establish itself at 0 db.

e) Recording Frequency Response

Scotch Tape type 102 and Scotch Tape type 203 should be used for calibration in the "Standard" and "Low Noise" positions respectively, unless otherwise requested. Feed a 1 kHz signal into the Line Input so that the Line

Output is 560 mV with the "Line & Phones" switch in the position "Direct".

15"/sec Standard: Put the Nagra into the "Record" mode and the "Line & Phones" switch to "Tape". Adjust the recording head azimuth at 15 kHz. Check that the frequency response from 30 Hz to 1 kHz is within ± 2 db and then adjust R 5 (fig. E 5.4) so that the response from 1 kHz to 15 kHz is also within ± 2 db.

15"/sec Low noise: adjust R 3 (fig. E 5.4) so that the response from 30 Hz to 20 kHz is within ± 2 db.

7 $\frac{1}{2}$ "/sec Standard: With the input at 500 Hz check that the Line Output is -1 db ± 1 db—i.e., that the level is between 450 mV and 560 mV. Adjust the level to exactly 560 mV with the "Line and Playback" level control. Check that the frequency response from 30 Hz to 500 Hz is within ± 2 db, then adjust R 9 (fig. E 5.4) so that the high frequency response from 500 Hz to 14 kHz is also within ± 2 db.

7 $\frac{1}{2}$ "/sec Low noise: Adjust R 7 (fig. E 5.4) so that the frequency response from 30 Hz to 15 kHz is within ± 2 db.

3 $\frac{3}{4}$ "/sec Standard: With the signal at 250 Hz, check that the output level is -1 db ± 1 db compared with the 7 $\frac{1}{2}$ "/sec Std level.

Check that the frequency response from 30 Hz to 250 Hz is within ± 3 db.

Adjust R 13 (fig. E 5.4) so that the high frequency response from 250 Hz to 8000 Hz is within ± 3 db.

3 $\frac{3}{4}$ "/sec Low noise: Adjust R 11 (fig. E 5.4) so that the frequency response from 30 Hz to 10 kHz is within ± 3 db.

16. Erasing

Carefully clean the erase head, short-circuit the limiter and close the Nagra, which should be put in the position "Test", "7 $\frac{1}{2}$ "/sec Std."

The microphone level controls should be fully anti-clockwise and an 800 Hz signal fed into the Line Input. The Line Output should feed an analyser voltmeter with an 800 Hz $\frac{1}{3}$ octave filter. With the "Line and Playback" level control fully clockwise, the signal should read +4 db on the modulometer (nominal maximum level).

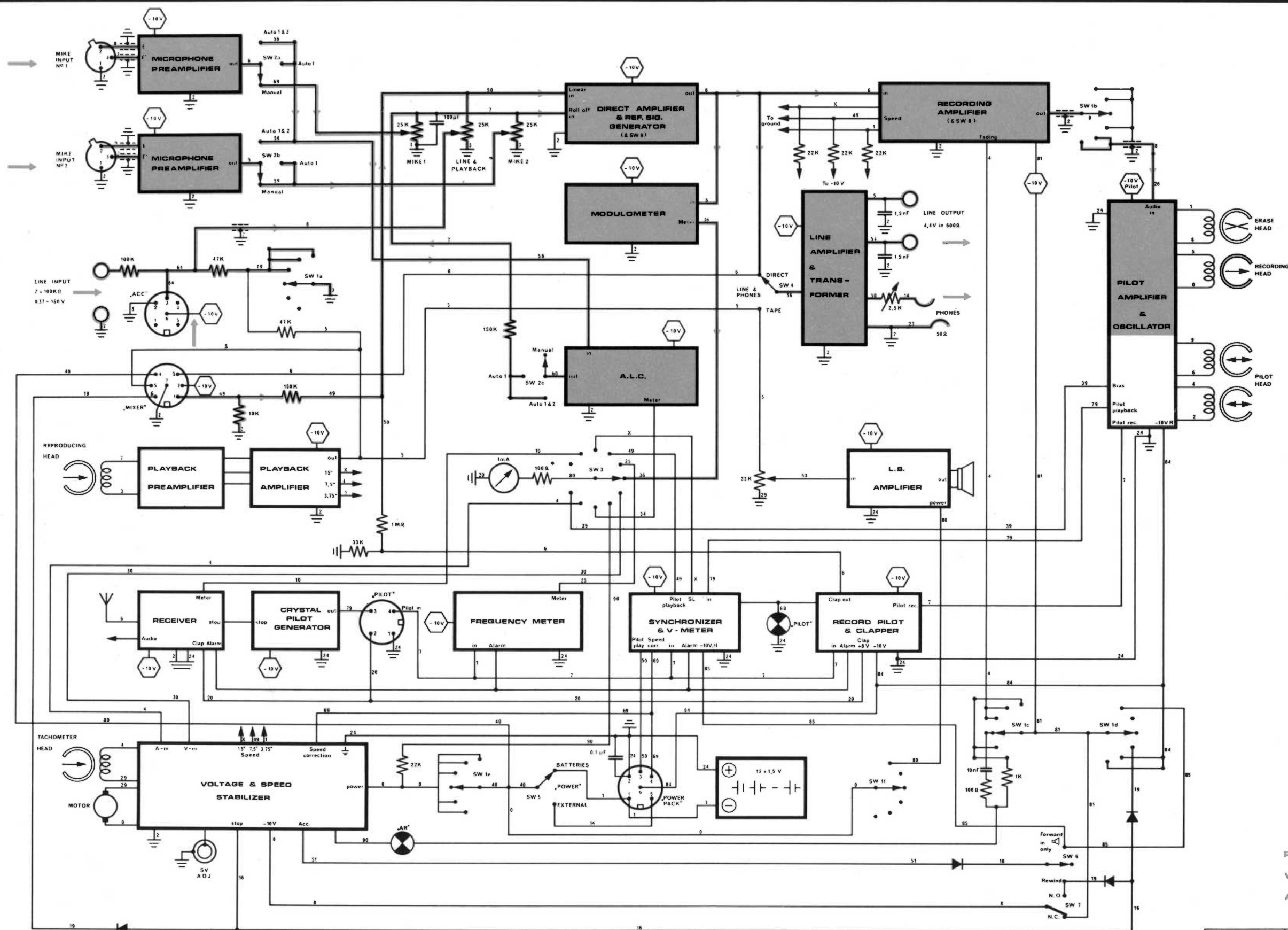
Record a fairly long length of tape and rewind. Remove the generator from the Line Input and play back a section of the recording. Pass back to "Record" making sure that all the level controls are fully anti-clockwise and that there is no input. Rewind again and play back so that the signal recorded indicates +4 db on the modulometer. Measure the residual signal at 800 Hz on the erased section of the tape. This should be equal to or better than -80 db.

17. General Check

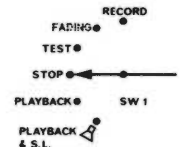
These checks should be made with the Nagra closed and are designed to verify the guaranteed specification of the Nagra IV (see Section 1).

- Power Consumption.
- Speed Stability, Wow & Flutter: a Wow and Flutter Meter type WFM or similar instrument should be used for these measurements. Speed inductor L1 on the speed stabilizer (fig. E 4., E 4.1) can be adjusted.
- Frequency Response, Distortion and Noise level of the Amplifier chain (Microphone preamplifier, Direct amplifier and Line amplifier).
- Frequency Response, Distortion, and Signal-to-Noise Ratio on "Record" and "Playback".
- Check the attenuators, the Automatic Level Control, Inputs and Outputs.

N.B. For distortion measurements, it is essential to demagnetize the heads before proceeding with the measurements.



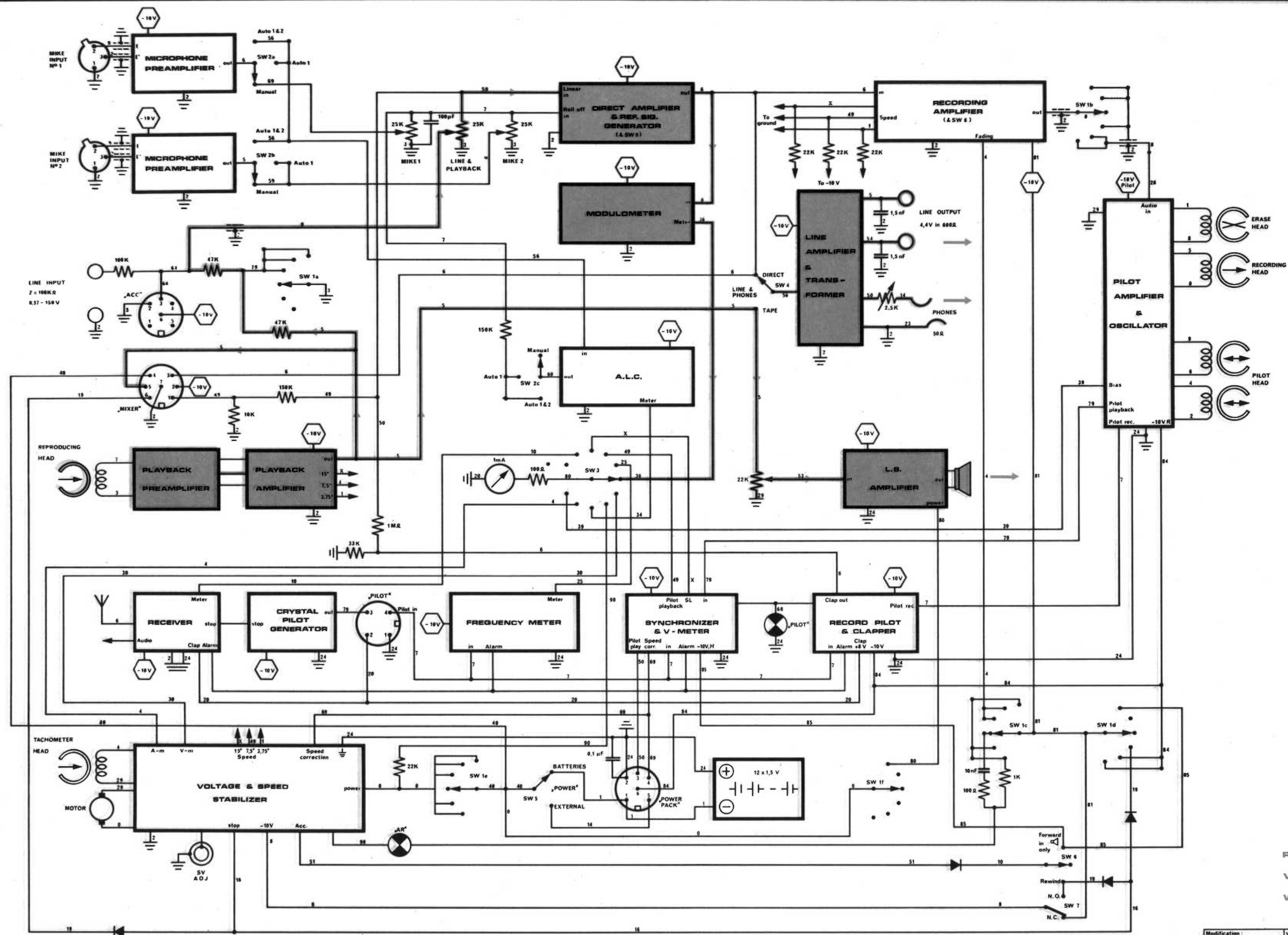
CABLE COLOR CODE	
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Grey
9	White
0	Black
X	Pink



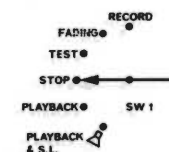
RECORDING CHAIN
VOIE D'ENREGISTREMENT
AUFNAHMEKANAL

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 - Switzerland - Telex 24 392
Date:	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 365 Fifth Avenue - New York, N.Y. 10017 Phone (212) 661-8988
CIRCUIT DIAGRAM		
BLOCK DIAGRAM		
NAGRA IV L		
Copy:	KUDELSKI	5.04.0.01

E 1.



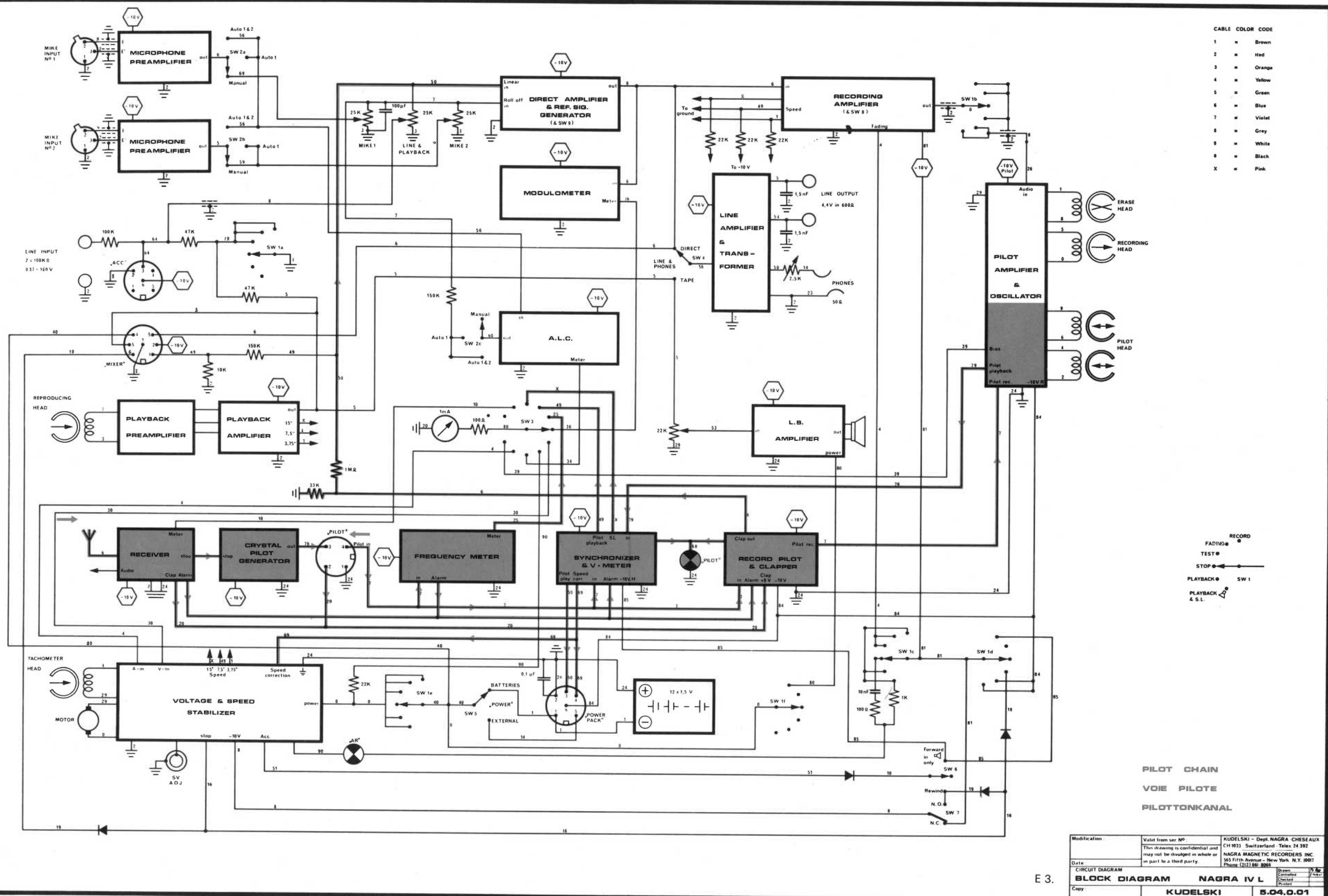
CABLE COLOR CODE		
1	=	Brown
2	=	Red
3	=	Orange
4	=	Yellow
5	=	Green
6	=	Blue
7	=	Violet
8	=	Grey
9	=	White
0	=	Black
X	=	Pink



PLAYBACK CHAIN
VOIE DE LECTURE
WIDERGABEKANAL

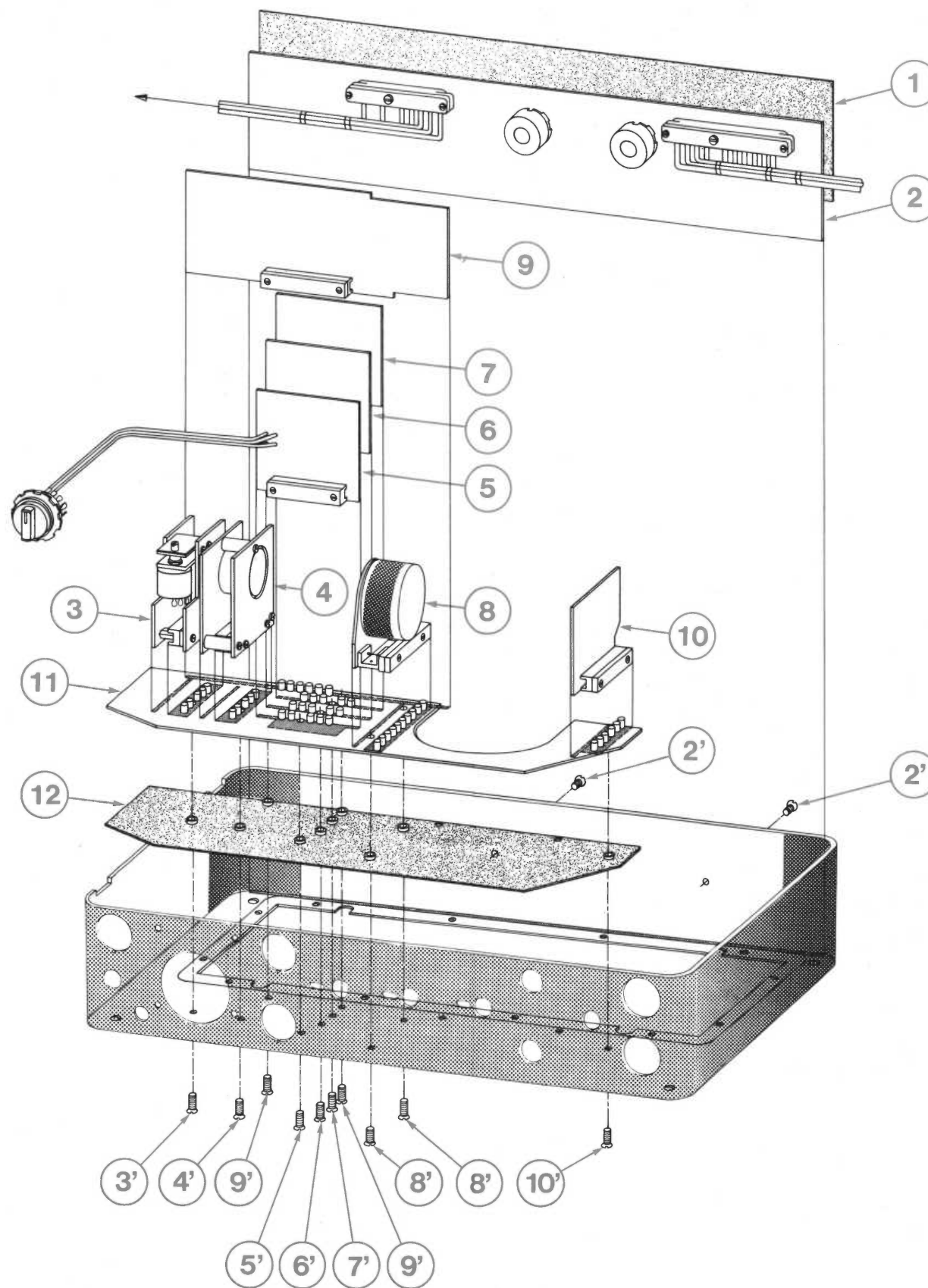
Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAU CH 1031 Switzerland - Telex 24 292
Date:	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 345 Fifth Avenue - New York, N.Y. 10017 Phone (212) 681-8066
CIRCUIT DIAGRAM		
BLOCK DIAGRAM		
NAGRA IV L		
Copy:	KUDELSKI	5.04.0.01

E 2.



E 3.

- 7 — LINE AMPLIFIER
— AMPLIFICATEUR LIGNE
— LINIENVERSTÄRKER
- 8 — LINE TRANSFORMER
— TRANSFORMATEUR LIGNE
— LINIENTRANSFORMATOR
- 9 — AUTOMATIC LEVEL CONTROL
— REGULATEUR AUTOMATIQUE DE SENSIBILITE
— AUTOMATISCHE REGELKONTROLLE
- 10 — LOUD SPEAKER AMPLIFIER
— AMPLIFICATEUR HAUT-PARLEUR
— LAUTSPRECHERVERSTÄRKER
- 11 — INTERCONNECTION
— INTERCONNEXION
— VERBINDUNGSKREIS
- 12 — INSULATED BOARD
— PLAQUE ISOLANTE
— ISOLIERUNGSPLATTE



- 1 — INSULATED BOARD
— PLAQUE ISOLANTE
— ISOLIERUNGSPLATTE
- 2 — VOLTAGE & SPEED STABILIZER
— STABILISATEUR DE TENSION ET VITESSE
— GESCHWINDIGKEITS UND SPANNUNGSREGLER
- 3 — MICROPHONE PREAMPLIFIER N°1
— PREAMPLIFICATEUR MICRO N°1
— MIKROPHONVORVERSTÄRKER N°1
- 4 — MICROPHONE PREAMPLIFIER N°2
— PREAMPLIFICATEUR MICRO N°2
— MIKROPHONVORVERSTÄRKER N°2
- 5 — DIRECT AMPLIFIER & REF. SIG. GENERATOR
— AMPLI DU DIRECT ET GENERATEUR DE REFERENCE
— "DIRECT" VERSTÄRKER UND REF. GENERATOR
- 6 — MODULOMETER OR VU-METER
— MODULOMETRE OU VU-METRE
— MODULOMETER ODER VU-METER

CIRCUIT MOUNTING IN THE BOX

MONTAGE DES CIRCUITS DU BOITIER

AUFBAU DER GEHÄUSEKREISE

VOLTAGE & SPEED STABILIZER

PART NUMBER : 09 04 775 0 01

Reference	Kudelski part Number	Designation				Manufacturer	Observation
RESISTORS							
R1	55 26 01 3473	47 kΩ	1/4W		10 %	Allen-Bradley	
R2	55 26 01 3473	47 kΩ	1/4W		10 %	Allen-Bradley	
R3	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R4	55 26 01 3103	10 kΩ	1/4W		10 %	Allen-Bradley	
R5	55 26 01 3102	1 kΩ	1/4W		10 %	Allen-Bradley	
R6	55 26 01 3103	10 kΩ	1/4W		10 %	Allen-Bradley	
R7	55 26 01 3222	2,2 kΩ	1/4W		10 %	Allen-Bradley	
R8	55 27 18 3474	470 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R9	55 27 18 3223	22 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R10	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R11	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R12	55 26 01 3471	470 Ω	1/4W		10 %	Allen-Bradley	
R13	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R14	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R15	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R16	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R17	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R18	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R19	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R20	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R21	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R22	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R23	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R24	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R25	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R26	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R27	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R28	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R29	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R30	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R31	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R32	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R33	55 26 01 3101	100 Ω	1/4W		10 %	Allen-Bradley	
R34	55 27 18 3224	220 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R35	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R36	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R37	55 26 01 3332	3,3 kΩ	1/4W		10 %	Allen-Bradley	
R38	55 27 18 3104	100 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R39	55 26 01 3473	47 kΩ	1/4W		10 %	Allen-Bradley	
R40	55 27 18 3562	5,6 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R41	55 27 18 3472	4,7 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R42	55 26 01 3470	47 Ω	1/4W		10 %	Allen-Bradley	
R43	55 26 01 3103	10 kΩ	1/4W		10 %	Allen-Bradley	
R44	55 26 01 3332	3,3 kΩ	1/4W		10 %	Allen-Bradley	
R45	55 26 01 3103	10 kΩ	1/4W		10 %	Allen-Bradley	
R46	55 26 01 3103	10 kΩ	1/4W		10 %	Allen-Bradley	
R47	55 27 18 3822	8,2 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R48	55 27 18 3822	8,2 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R49	55 26 01 3823	82 kΩ	1/4W		10 %	Allen-Bradley	
R50	55 26 01 3103	10 kΩ	1/4W		10 %	Allen-Bradley	
R51	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R52	55 26 01 3102	1 kΩ	1/4W		10 %	Allen-Bradley	
R53	55 26 01 3272	2,7 kΩ	1/4W		10 %	Allen-Bradley	
R54	55 26 01 3682	6,8 kΩ	1/4W		10 %	Allen-Bradley	
R55	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R56	55 26 01 3221	220 Ω	1/4W		10 %	Allen-Bradley	
R57	55 26 01 3272	2,7 kΩ	1/4W		10 %	Allen-Bradley	
R58	55 26 01 3332	3,3 kΩ	1/4W		10 %	Allen-Bradley	
R59	55 26 01 3152	1,5 kΩ	1/4W		10 %	Allen-Bradley	
R60	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R61	55 26 01 3332	3,3 kΩ	1/4W		10 %	Allen-Bradley	
R62	55 27 18 3223	22 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R63							
R64	55 27 18 3223	22 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil
R65							
R66	55 30 08 5208	2 Ω	1W	Bob.		10 %	Dralowid
R67	55 26 01 3471	470 Ω	1/4W		10 %	Allen-Bradley	
R68	55 26 01 3331	330 Ω	1/4W		10 %	Allen-Bradley	
R69	55 26 01 3471	470 Ω	1/4W		10 %	Allen-Bradley	
R70	55 26 01 3221	220 Ω	1/4W		10 %	Allen-Bradley	
R71	55 30 08 5208	2 Ω	1W	Wired		10 %	Dralowid
R72	55 26 01 3333	33 kΩ	1/4W		10 %	Allen-Bradley	
R73	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R74	55 26 01 3102	1 kΩ	1/4W		10 %	Allen-Bradley	

Reference	Kudelski part Number	Designation				Manufacturer	Observation
R75	55 26 01 3471	470 Ω	1/4W		10 %	Allen-Bradley	
R76	55 26 01 3221	220 Ω	1/4W		10 %	Allen-Bradley	
R77	55 26 01 3472	4,7 k Ω	1/4W		10 %	Allen-Bradley	or Bridge
R78	56 31 00 1502	5 k Ω		Variable	10 %	Allen-Bradley	
R79	55 27 18 3333	33 k Ω	1/4W	TR5	200 ppm	Electrosil	
R80	55 26 01 3334	330 k Ω	1/4W		10 %	Allen-Bradley	
R81	55 27 18 3153	15 k Ω	1/4W	TR5	200 ppm	Electrosil	
R82	55 26 01 3472	4,7 k Ω	1/4W		10 %	Allen-Bradley	
R83	55 26 01 3102	1 k Ω	1/4W		10 %	Allen-Bradley	
R84							
R85	55 26 01 3123	12 k Ω	1/4W		10 %	Allen-Bradley	
R86	55 26 01 3822	8,2 k Ω	1/4W		10 %	Allen-Bradley	
R87	55 26 01 3223	22 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R88	55 26 01 3223	22 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R89	55 26 01 3223	22 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R90	55 26 01 3104	100 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R91	55 26 01 3104	100 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R92	55 26 01 3223	22 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R93	55 26 01 3223	22 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R94	55 26 01 3224	220 k Ω	1/4W		10 %	Allen-Bradley	30"/s only
R95	55 26 01 3223	22 k Ω	1/4W		10 %	Allen-Bradley	30"/s only

CAPACITORS

C1	53 22 60 7333	33 nF		Polyester	250 V	20 %	Hunts	
C2	53 22 60 7473	47 nF		Polyester	250 V	20 %	Hunts	
C3	52 12 02 4750	4,7 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C4	53 22 60 7473	47 nF		Polyester	250 V	20 %	Hunts	
C5	52 12 01 6850	6,8 μ F	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C6	53 22 60 7473	47 nF		Polyester	250 V	20 %	Hunts	
C7	52 12 02 4750	4,7 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C8	52 12 02 4750	4,7 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C9	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C10	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C11	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C12	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C13	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C14	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C15	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C16	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C17	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	
C18	52 12 02 3900	39 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C19	53 00 50 7272	2,7 nF		Polystyrene	125 V	1 %	Philips	
C20	53 00 50 8102	1 nF		Polystyrene	500 V	1 %	Philips	
C21	52 12 02 3900	39 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C22	53 22 60 7473	47 nF		Polyester	250 V	20 %	Hunts	
C23	53 00 50 7473	47 nF		Polystyrene	125 V	20 %	Philips	
C24	53 22 60 7223	22 nF		Polyester	250 V	20 %	Hunts	
C25	53 22 61 7104	0,1 μ F		Polyester	250 V	20 %	Hunts	
C26	52 12 04 1050	1 μ F	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C27	52 12 04 1050	1 μ F	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C28	53 00 50 5273	27 nF		Polystyrene	63 V	1 %	Philips	
C29	53 22 61 7104	0,1 μ F		Polyester	250 V	20 %	Hunts	
C30	52 12 04 3350	3,3 μ F	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C31	53 22 61 7104	0,1 μ F		Polyester	250 V	20 %	Hunts	
C32	52 12 02 2210	220 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C33	52 12 02 1210	120 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C34	52 12 04 3350	3,3 μ F	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C35	52 12 04 3350	3,3 μ F	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C36	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	30"/s only
C37	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	30"/s only
C38	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	30"/s only
C39	53 22 60 9101	100 pF		Polyester	750 V	20 %	Hunts	30"/s only
C40	52 12 02 4750	4,7 μ F	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C41	53 22 60 7103	10 nF		Polyester	250 V	20 %	Hunts	

DIODES

D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D4	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D5	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D6	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D7	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D8	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D9	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D10	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D11	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D12	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D13	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D14	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D15	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania

Reference	Kudelski part Number	Designation				Manufacturer	Observation
D16	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	
D17	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	
D18	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	
D19	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	
D20	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	
D21	51 03 00 3000	Silicon	IS311			Hitachi	
D22	51 09 00 4020	Zener	IN56 A			Motorola	
D22	51 00 00 4040	Zener	BZY 88/C			Philips	
D23	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	30"/s only
D24	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	30"/s only
D25	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania	30"/s only

TRANSISTORS

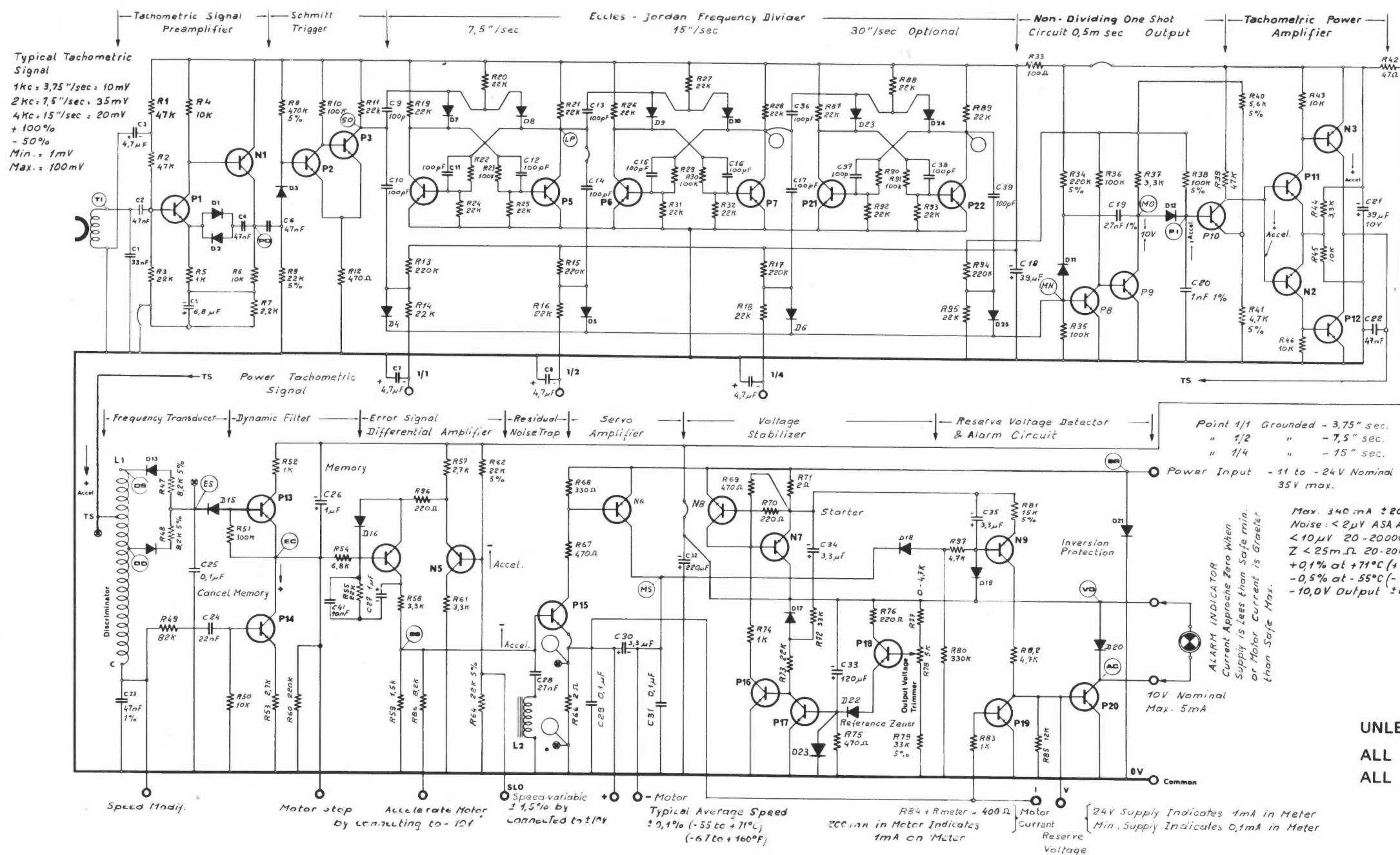
N1	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N1	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N2	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N2	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N3	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
N3	50 09 00 3010	Silicon	NPN	ES8070	Factory Selected	(Replaceable by 2N3302)	Motorola	
N4	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N4	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N5	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N5	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N6	50 02 00 3000	Silicon	NPN	RCA 40-250			RCA	
N7	50 02 00 3000	Silicon	NPN	RCA 40-250			RCA	
N8	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
N8	50 09 00 3010	Silicon	NPN	ES8070	Factory Selected	(Replaceable by 2N3302)	Motorola	
N9	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N9	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P3	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P3	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P4	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P4	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P5	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P5	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P6	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P6	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P7	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P7	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P8	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P8	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P9	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P9	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P10	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P10	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P11	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P11	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P12	50 01 00 2060	Silicon	PNP	IW8670A	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P12	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P13	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P13	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P14	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P14	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P15	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P15	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P16	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P16	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P17	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P17	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P18	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P18	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P19	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P19	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P20	50 01 00 2060	Silicon	PNP	IW8670A	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P20	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P21	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	30"/s only
P21	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	30"/s only
P22	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	30"/s only
P22	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	30"/s only

INDUCTORS

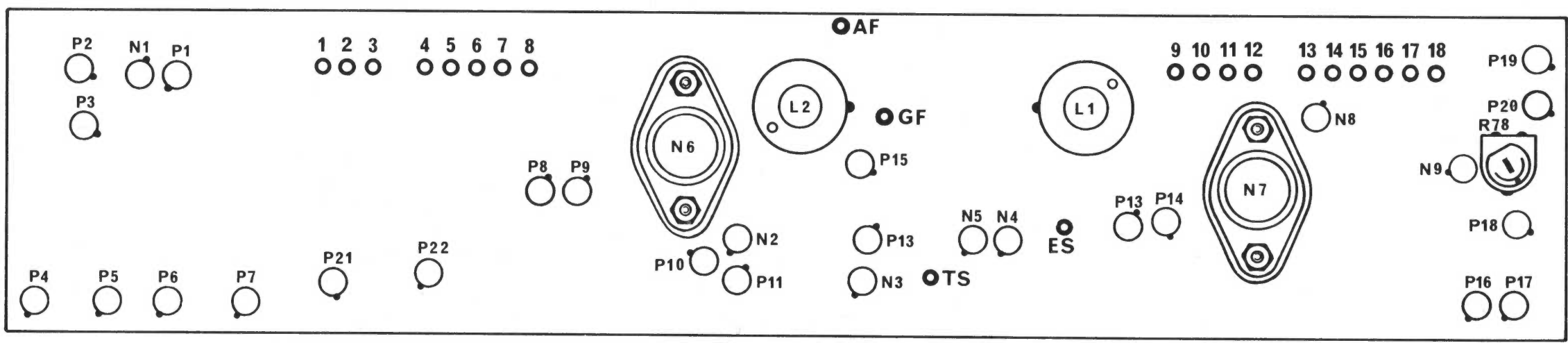
L1	99 99 11 3000	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 100$	Philips
L2	99 99 13 3000	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 220$	Philips

CONNECTORS

01 04 77 0002	Pin Female	Kudelski
---------------	------------	----------



1. - T I Tachometric Signal
2. - T I Tachometric Signal
3. - 7,5'' / sec.
4. - 3,75'' / sec.
5. - 15'' / sec.
6. - Motor +
7. - Motor -
8. - Motor acceleration
9. - Speed varier
10. - Speed correction S L O
11. - Motor stop
12. - Common 0 V
13. - Common batt. 0 V
14. - B R Power Input - 11 to -24 V DC
15. - V O - 10 V DC Output $\pm 0,5\%$
16. - Motor current
17. - A R Indicator
18. - V - M Batt. reserve



$L_2 = 938\text{ mH}$ at 1 kHz
 1397 Turns $\phi 0,08\text{ mm}$

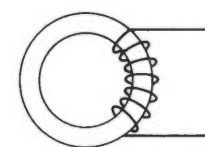
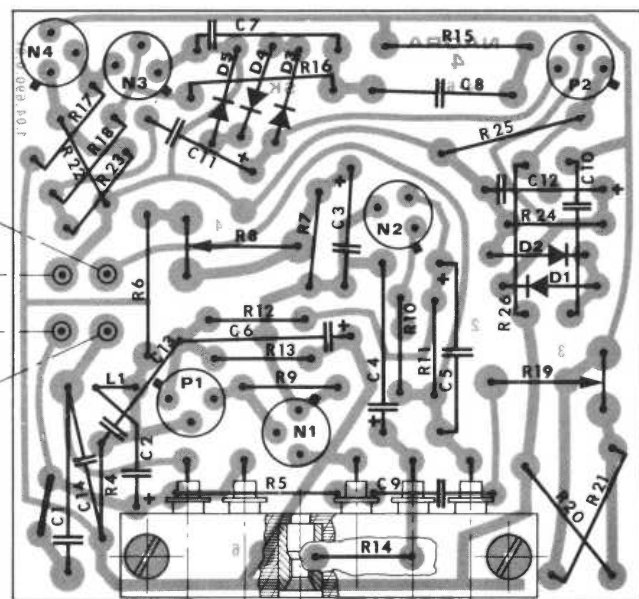
$L_1 = 539\text{ mH}$
 1863 Turns $\phi 0,08\text{ mm}$

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 10 28 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 661-8056
CIRCUIT DIAGRAM:		Drawn: J. M. Controlled: J. M. Checked: J. M. Printed: J. M.
VOLTAGE & SPEED STABILIZER		
Copy:	KUDELSKI	09 04 775 0 01

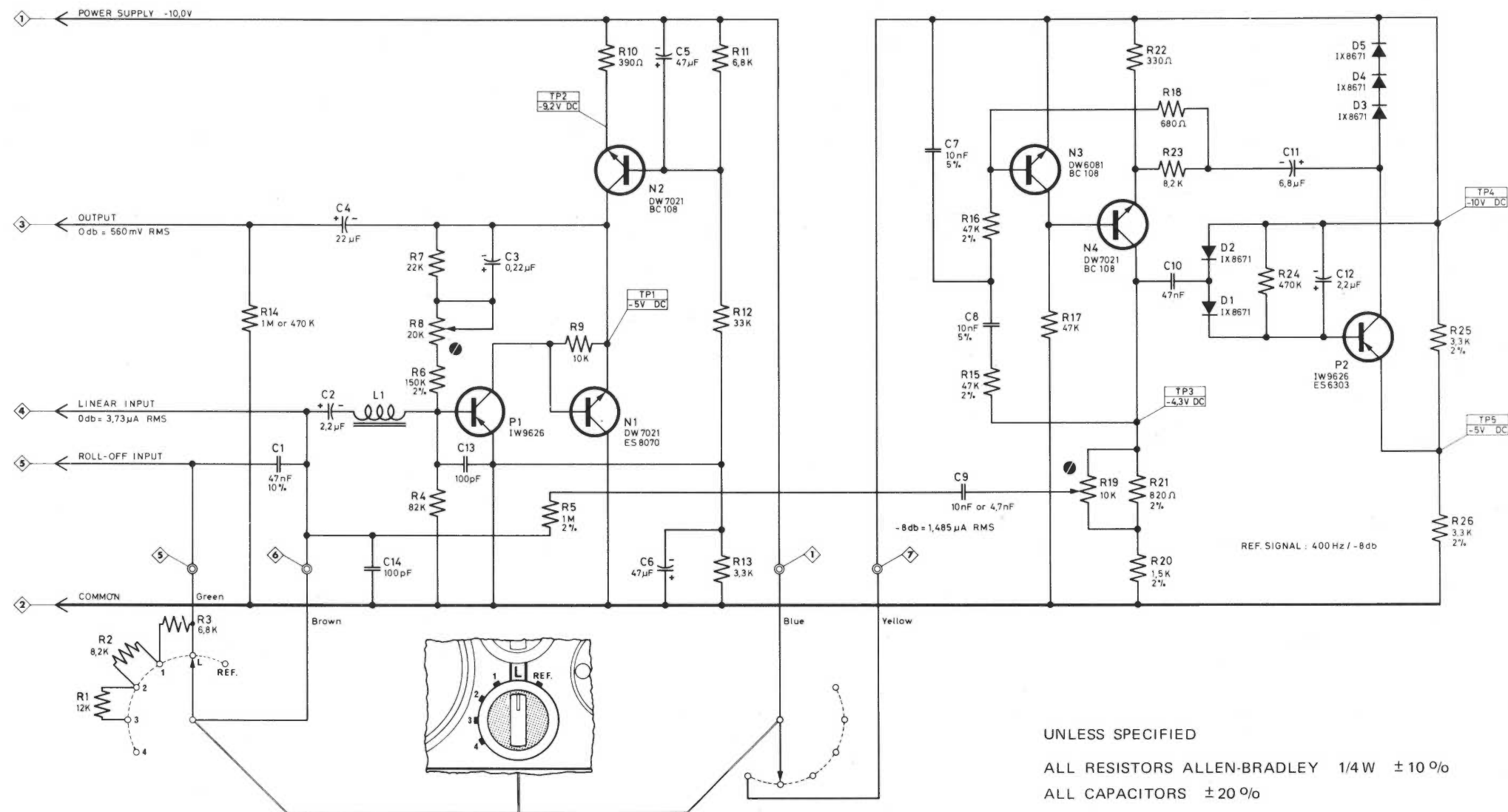
DIRECT AMPLIFIER & REF. SIG. GENERATOR

PART NUMBER : 09 04 690 0 01

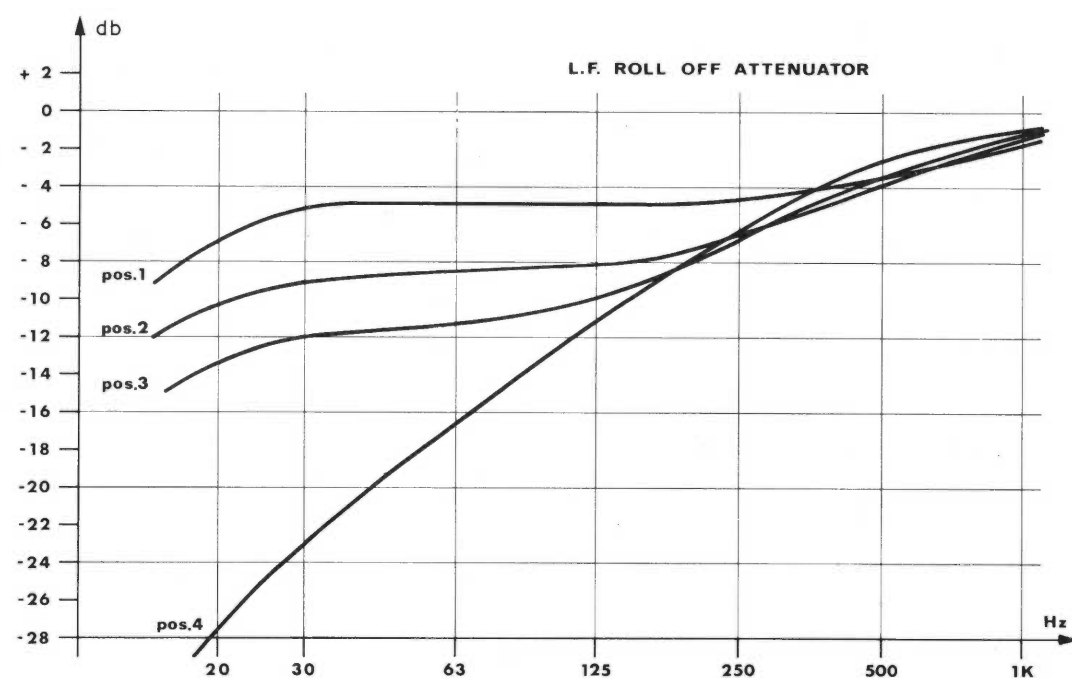
Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	55 26 01 3123	12 kΩ	1/4W			10 %	Allen-Bradley	
R2	55 26 01 3822	8,2 kΩ	1/4W			10 %	Allen-Bradley	
R3	55 26 01 3682	6,8 kΩ	1/4W			10 %	Allen-Bradley	
R4	55 26 01 3823	82 kΩ	1/4W			10 %	Allen-Bradley	
R5	55 27 18 3105	1 M Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R6	55 27 18 3154	150 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R7	55 26 01 3223	22 kΩ	1/4W			10 %	Allen-Bradley	
R8	56 30 00 1203	20 kΩ			variable	20 %	Ruwido or Dralowid	
R9	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R10	55 26 01 3391	390 Ω	1/4W			10 %	Allen-Bradley	
R11	55 26 01 3682	6,8 kΩ	1/4W			10 %	Allen-Bradley	
R12	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R13	55 26 01 3332	3,3 kΩ	1/4W			10 %	Allen-Bradley	
R14	55 26 01 3105	1 M Ω	1/4W			10 %	Allen-Bradley	
R14	55 26 01 3474	470 kΩ	1/4W			10 %	Allen-Bradley	
R15	55 27 18 3473	47 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R16	55 27 18 3473	47 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R17	55 26 01 3473	47 kΩ	1/4W			10 %	Allen-Bradley	
R18	55 26 01 3681	680 Ω	1/4W			10 %	Allen-Bradley	
R19	56 30 00 1103	10 kΩ			variable	20 %	Ruwido or Dralowid	
R20	55 27 18 3152	1,5 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R21	55 27 18 3821	820 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R22	55 26 01 3331	330 Ω	1/4W			10 %	Allen-Bradley	
R23	55 26 01 3822	8,2 kΩ	1/4W			10 %	Allen-Bradley	
R24	55 26 01 3474	470 kΩ	1/4W			10 %	Allen-Bradley	
R25	55 27 18 3332	3,3 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R26	55 27 18 3332	3,3 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
CAPACITORS								
C1	53 00 37 7473	47 nF		Polyester	250 V	10 %	Philips	
C2	52 12 03 2250	2,2 μF	Electrolytic	Dry Tantalum	20 V	20 %	Sprague	
C3	52 12 04 2260	0,22 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C4	52 12 03 2200	22 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C5	52 12 01 4700	47 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C6	52 12 01 4700	47 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C7	53 21 36 8103	10 nF		Polyester	400 V	5 %	Fribourg	
C8	53 21 36 8103	10 nF		Polyester	400 V	5 %	Fribourg	
C9	53 22 60 7103	10 nF		Polyester	250 V	20 %	Hunts	
C9	53 22 60 7472	4,7 nF		Polyester	250 V	20 %	Hunts	
C10	53 22 60 7473	47 nF		Polyester	250 V	20 %	Hunts	
C11	52 12 01 6850	6,8 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C12	52 12 03 2250	2,2 μF	Electrolytic	Dry Tantalum	20 V	20 %	Sprague	
DIODES								
D1	51 01 00 2000	Silicon	1X8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D2	51 01 00 2000	Silicon	1X8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D3	51 01 00 2000	Silicon	1X8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D4	51 01 00 2000	Silicon	1X8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D5	51 01 00 2000	Silicon	1X8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
TRANSISTORS								
N1	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
N1	50 09 00 3010	Silicon	NPN	ES8070	Factory Selected	(Replaceable by 2N3302)	Motorola	
N2	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
N2	50 00 00 3010	Silicon	NPN	BC108		(Replaceable by 2N3302)	Philips	
N3	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N3	50 00 00 3010	Silicon	NPN	BC108		(Replaceable by 2N2484)	Philips	
N4	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N4	50 00 00 3010	Silicon	NPN	BC108		(Replaceable by 2N2484)	Philips	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
INDUCTORS								
L1	99 99 13 3080	Toroid	2P653 46	4C4 or 80K1			Philips or Siemens	
CONNECTORS								
	01 04 77 0002	Pin Male					Kudelski	
SWITCH								
	40 46 20 2000	Switch	01-2 × 6				Elma	



$L_1 = 10 \mu H \pm 30\%$ at 2,5 MHz
20 Turns ϕ 0,25 mm



UNLESS SPECIFIED
ALL RESISTORS ALLEN-BRADLEY 1/4W $\pm 10\%$
ALL CAPACITORS $\pm 20\%$



REFERENCE SIGNAL GENERATOR						
Temperature (°C)	Frequency (Hz)	TP 3 (V RMS)	H ₂ (‰)	H ₃ (‰)	Total Harmonic Distorsion (‰)	db
-55	390	1,84	2,9	0,75	3,0	-0,5
-20	395	1,80	2,8	1,20	3,2	-0,3
+23	400	1,74	2,8	1,80	3,5	0
+42	395	1,70	2,9	1,90	3,4	+0,2
+71	395	1,64	3,0	2,20	3,7	+0,5

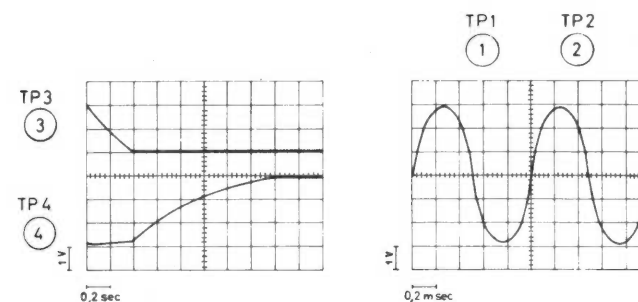
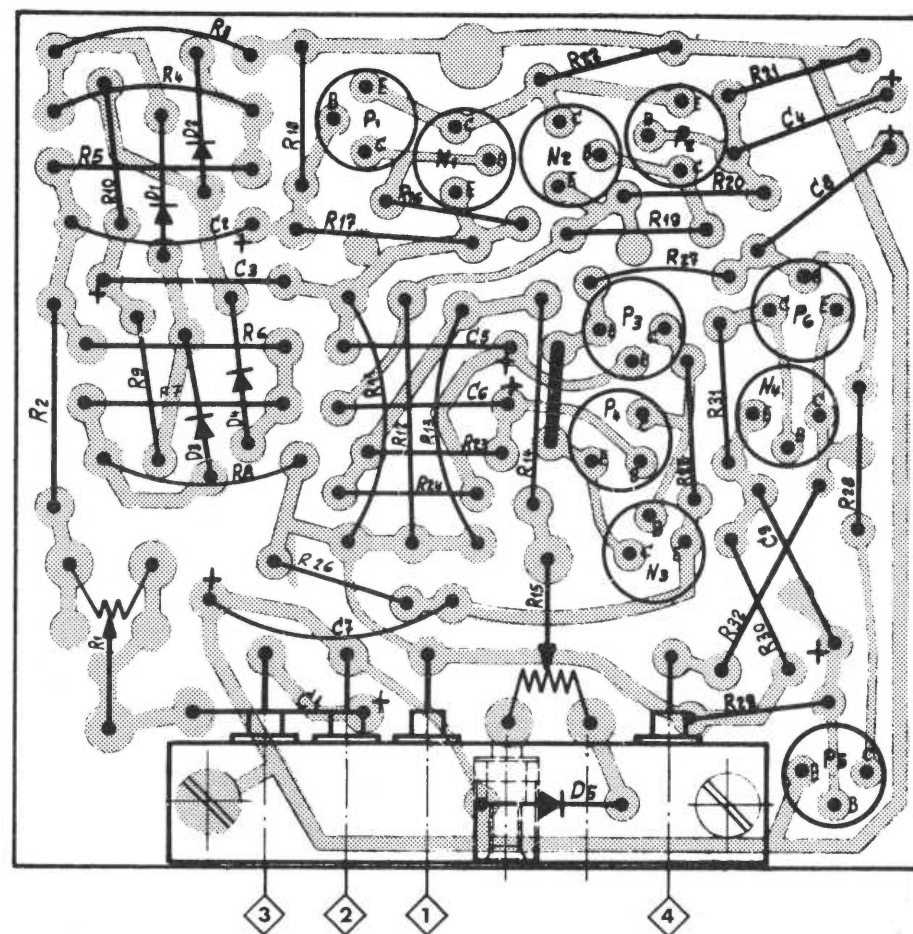
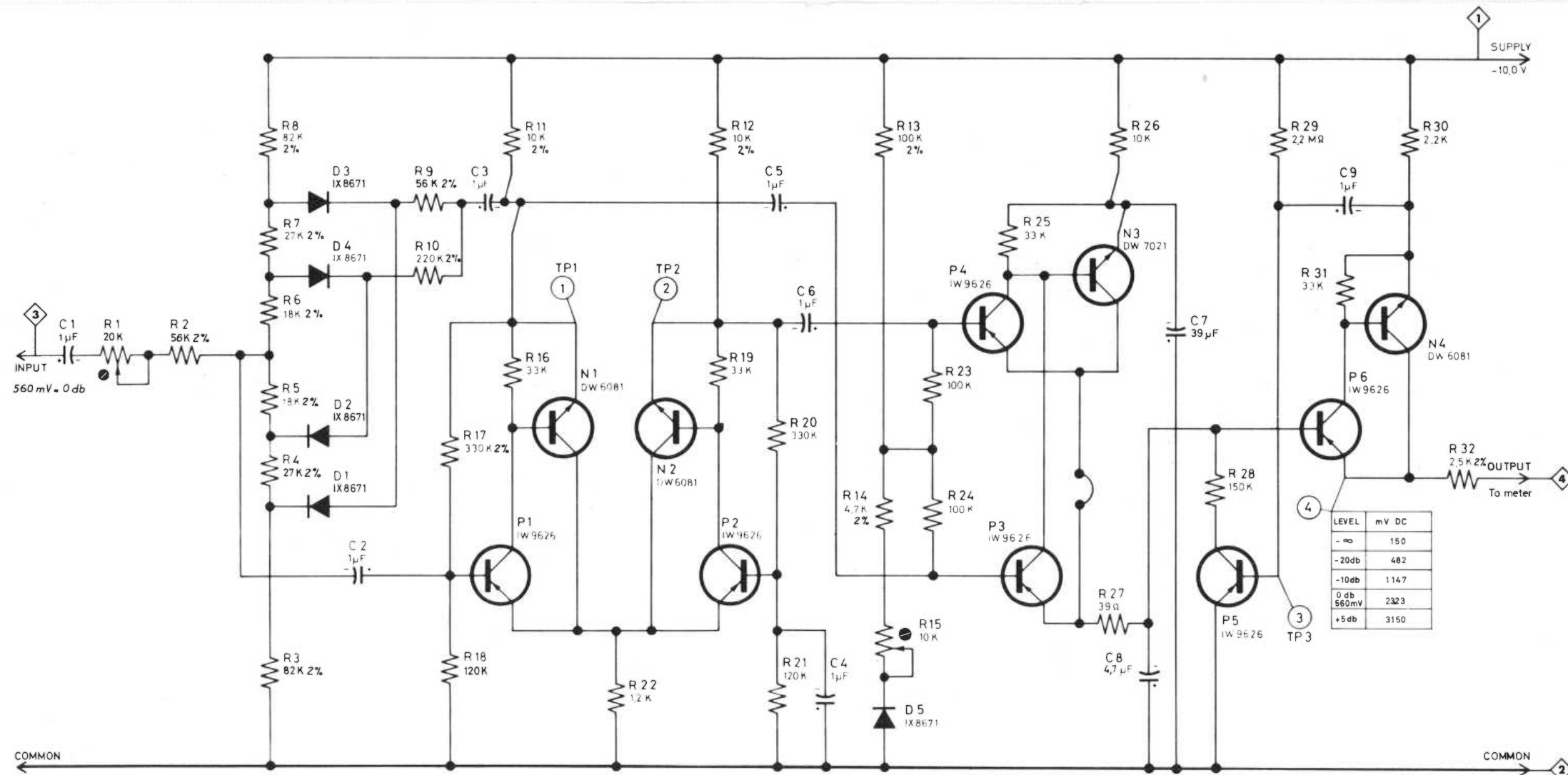
Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392	
Date: 6. 5. 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone (212) 661-8066	
CIRCUIT DIAGRAM		Drawn	20/
DIRECT AMPLIFIER & REF. SIG. GENERATOR		Controlled	1/
Copy:		Checked	2/
		Printed	3/
		KUDELSKI	
		09 04 690 0 01	

E 4.2

MODULOMETER

PART NUMBER : 09 04 562 0 01

Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	56 31 00 1203	20 kΩ			Variable	10 %	Ruwido	
R2	55 27 18 3563	56 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R3	55 27 18 3823	82 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R4	55 27 81 3273	27 KΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R5	55 27 18 3183	18 KΩ	1/4W	TR5	200 ppm	2%	Electrosil	
R6	55 27 18 3183	18 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R7	55 27 18 3273	27 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R8	55 27 18 3823	82 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R9	55 27 19 3563	56 kΩ	1/4W	TR4	200 ppm	2 %	Electrosil	
R10	55 27 19 3224	220 kΩ	1/4W	TR4	200 ppm	2 %	Electrosil	
R11	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R12	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R13	55 27 18 3104	100 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R14	55 27 18 3472	4,7 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R15	56 31 00 1103	10 kΩ			Variable	10 %	Ruwido	
R16	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R17	55 27 18 3334	330 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R18	55 26 01 3124	120 kΩ	1/4W			10 %	Allen-Bradley	
R19	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R20	55 26 01 3334	330 kΩ	1/4W			10 %	Allen-Bradley	
R21	55 26 01 3124	120 kΩ	1/4W			10 %	Allen-Bradley	
R22	55 26 01 3122	1,2 kΩ	1/4W			10 %	Allen-Bradley	
R23	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R24	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R25	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R26	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R27	55 26 01 3390	39 Ω	1/4W			10 %	Allen-Bradley	
R28	55 26 01 3154	150 kΩ	1/4W			10 %	Allen-Bradley	
R29	55 26 01 3225	2,2 MΩ	1/4W			10 %	Allen-Bradley	
R30	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R31	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R32	55 27 18 3252	2,5 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
CAPACITORS								
C1	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C2	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C3	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C4	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C5	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C6	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C7	52 12 02 3900	39 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C8	52 12 02 4750	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C9	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
DIODES								
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D4	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D5	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
TRANSISTORS								
N1	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N1	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N2	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N2	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N3	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
N3	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N3302)	Motorola	
N4	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N4	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P3	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P3	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P4	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P4	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P5	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P5	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P6	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P6	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
CONNECTORS								
	01 04 78 0002	Pin Male					Kudelski	



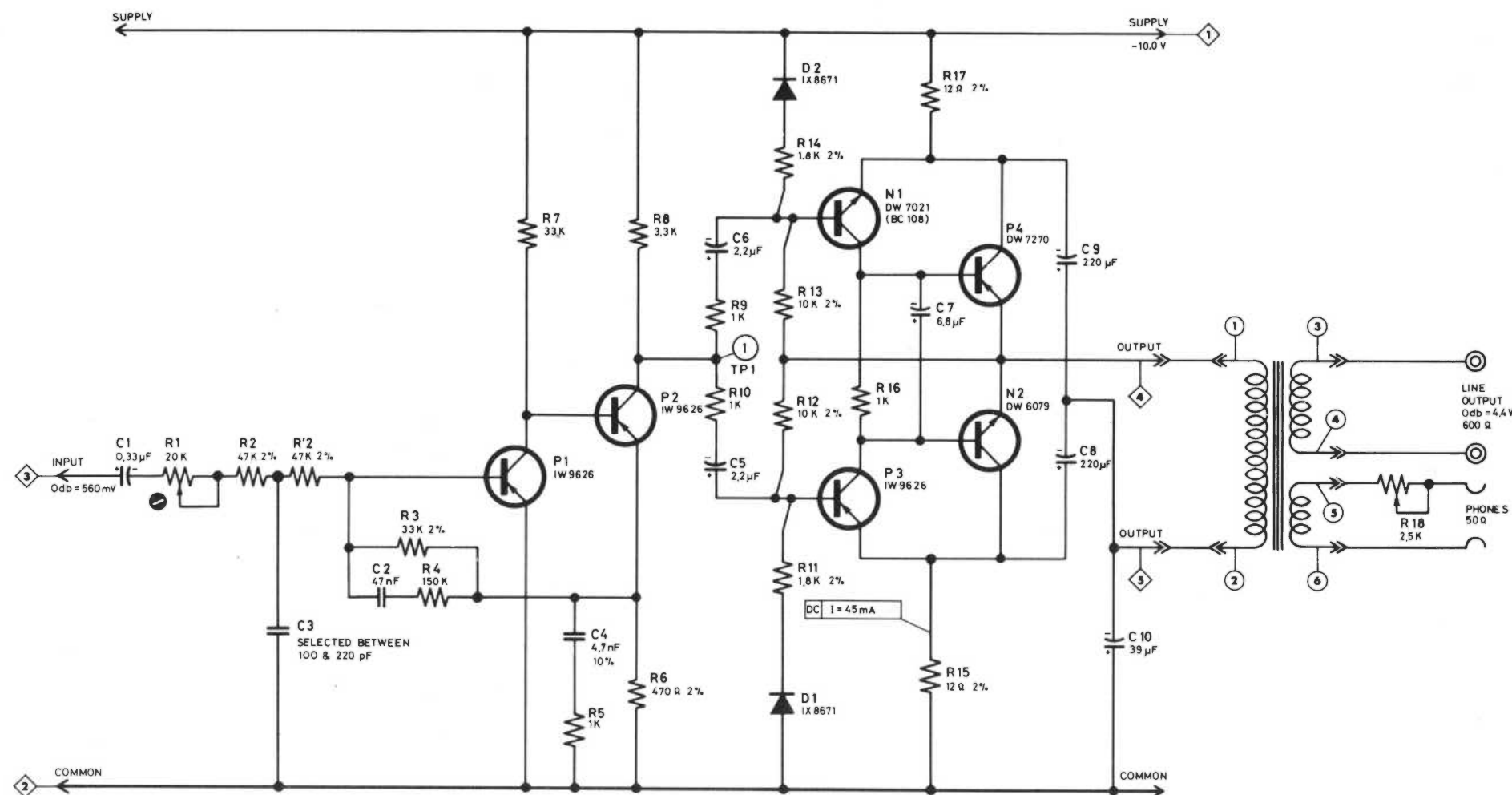
UNLESS SPECIFIED
 ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$
 ALL CAPACITORS $\pm 20\%$

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 - Switzerland - Telex 24 382
Date: 7 27 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 981-8088
CIRCUIT DIAGRAM:		Drawn: <i>[Signature]</i> Controlled: <i>[Signature]</i> Checked: <i>[Signature]</i> Printed: <i>[Signature]</i>
MODULOMETER NAGRA IV		
Copy:	KUDELSKI	09 04 562 0 01

LINE AMPLIFIER & TRANSFORMER

PART NUMBER : 09 04 720 0 01

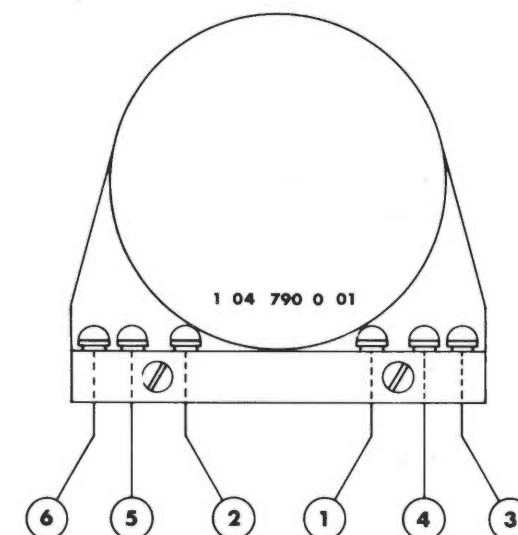
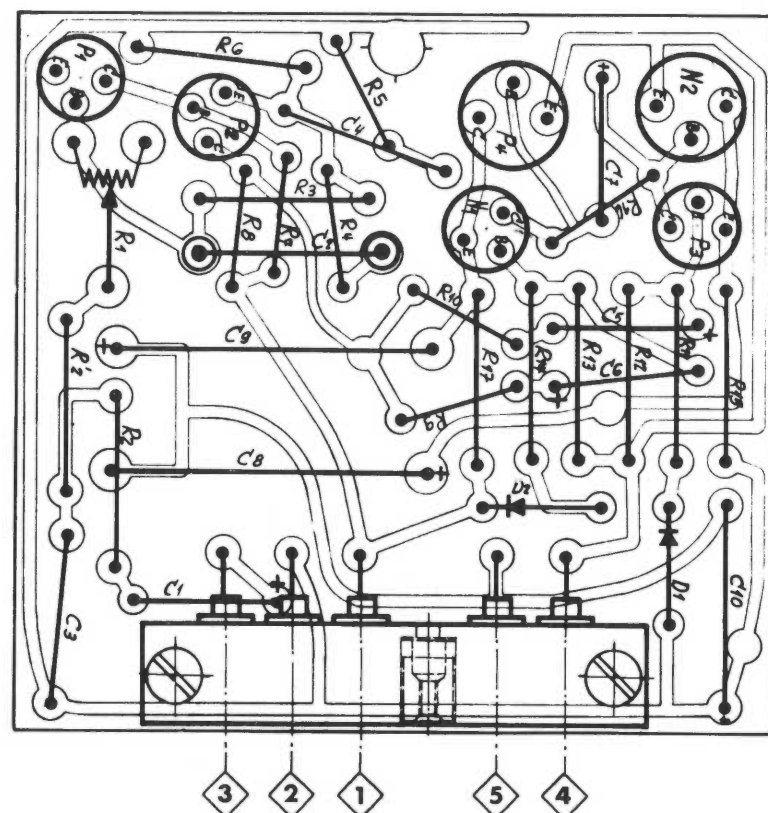
Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	56 30 00 1203	20 kΩ				Variable	20 %	Dralowid
R2	55 27 18 3473	47 kΩ	1/4W	TR5		200 ppm	2 %	Electrosil
R2	55 27 18 3473	47 kΩ	1/4W	TR5		200 ppm	2 %	Electrosil
R3	55 27 18 3333	33 kΩ	1/4W	TR5		200 ppm	2 %	Electrosil
R4	55 26 01 3154	150 kΩ	1/4W				10 %	Allen-Bradley
R5	55 26 01 3102	1 kΩ	1/4W				10 %	Allen-Bradley
R6	55 27 18 3471	470 Ω	1/4W	TR5		200 ppm	2 %	Electrosil
R7	55 26 01 3333	33 kΩ	1/4W				10 %	Allen-Bradley
R8	55 26 01 3332	3,3 kΩ	1/4W				10 %	Allen-Bradley
R9	55 26 01 3102	1 kΩ	1/4W				10 %	Allen-Bradley
R10	55 26 01 3102	1 kΩ	1/4W				10 %	Allen-Bradley
R11	55 26 01 3182	1,8 kΩ	1/4W	TR5		200 ppm	2 %	Electrosil
R12	55 27 18 3103	10 kΩ	1/4W	TR5		200 ppm	2 %	Electrosil
R13	55 27 18 3103	10 kΩ	1/4W	TR5		200 ppm	2 %	Electrosil
R14	55 27 18 3182	1,8 kΩ	1/4W	TR5		200 ppm	2 %	Electrosil
R15	55 27 18 3120	12 Ω	1/4W	TR5		200 ppm	2 %	Electrosil
R16	55 26 01 3102	1 kΩ	1/4W				10 %	Allen-Bradley
R17	55 27 18 3120	12 Ω	1/4W	TR5		200 ppm	2 %	Electrosil
CAPACITORS								
C1	52 12 04 3360	0,33 μF	Electrolytic	Dry Tantalum	35 V	20 %		Sprague
C2	53 22 60 7473	47 nF		Polyester	250 V	20 %		Hunts
C3	53 32 04 8101	100 pF		Ceramic	500 V	20 %		ERIE
C3	53 32 04 8121	120 pF		Ceramic	500 V	20 %		ERIE
C3	53 32 04 8151	150 pF		Ceramic	500 V	20 %		ERIE
C3	53 32 04 8181	180 pF		Ceramic	500 V	20 %		ERIE
C3	53 32 04 8221	220 pF		Ceramic	500 V	20 %		ERIE
C4	53 22 60 7472	4,7 nF		Polyester	250 V	20 %		Hunts
C5	52 12 03 2250	2,2 μF	Electrolytic	Dry Tantalum	20 V	20 %		Sprague
C6	52 12 03 2250	2,2 μF	Electrolytic	Dry Tantalum	20 V	20 %		Sprague
C7	52 12 01 6850	6,8 μF	Electrolytic	Dry Tantalum	6 V	20 %		Sprague
C8	52 12 02 2210	220 μF	Electrolytic	Dry Tantalum	10 V	20 %		Sprague
C9	52 12 02 2210	220 μF	Electrolytic	Dry Tantalum	10 V	20 %		Sprague
C10	52 12 02 3900	39 μF	Electrolytic	Dry Tantalum	10 V	20 %		Sprague
DIODES								
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania			SGS or Sylvania
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania			SGS or Sylvania
TRANSISTORS								
N1	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)		SGS-Fairchild
N2	50 01 00 3090	Silicon	NPN	DW6079	Factory Selected	(Replaceable by 2N3107)		SGS-Fairchild
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)		SGS-Fairchild
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)		Motorola
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)		SGS-Fairchild
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)		Motorola
P3	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)		SGS-Fairchild
P3	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)		Motorola
P4	50 01 00 2100	Silicon	PNP	DW7270	Factory Selected	(Replaceable by 2N4030)		SGS-Fairchild
CONNECTORS								
	01 04 78 0002	Pin Male					Kudelski	



1
DC 5V

UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$
ALL CAPACITORS $\pm 20\%$



Transformer for 4,4 V / 600 Ω
OUTPUT

- 1 260 Turns $\varnothing 0,5$ mm
- 2 1000 Turns $\varnothing 0,25$ mm
- 3 120 Turns $\varnothing 0,25$ mm
- 4 380 Turns $\varnothing 0,35$ mm

Modification for 1,55V / 100 Ω

- 3 380 Turns $\varnothing 0,35$ mm
- 4

E4.4

Modification :	Valid from ser. N° :	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 382
Date : 7 22 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone (212) 641-8844
CIRCUIT DIAGRAM :		Drawn : Controlled : Checked : Printed :
LINE AMPLIFIER & TRANSFORMER		
Copy :	KUDELSKI	09 04 720 0 01

MICROPHONE PREAMPLIFIER - STANDARD 200 Ω or 50 Ω (QPSE XoYo)

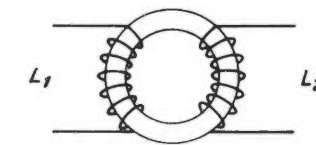
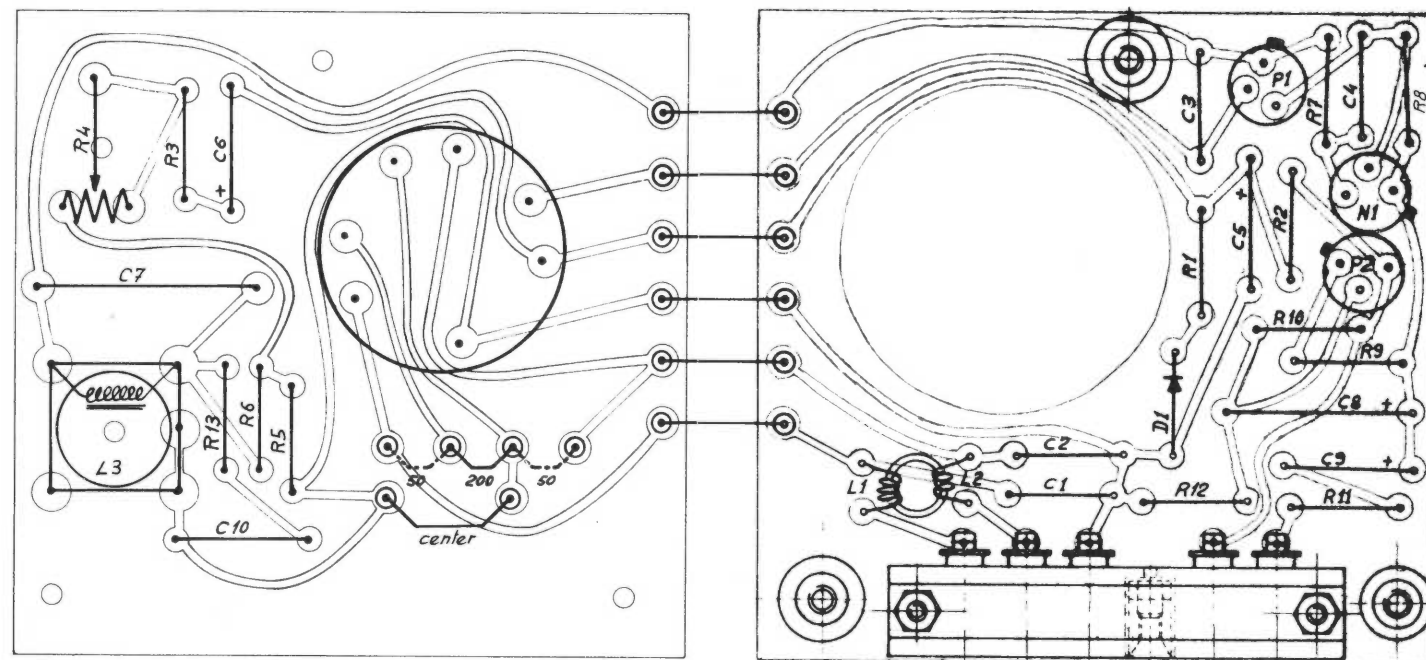
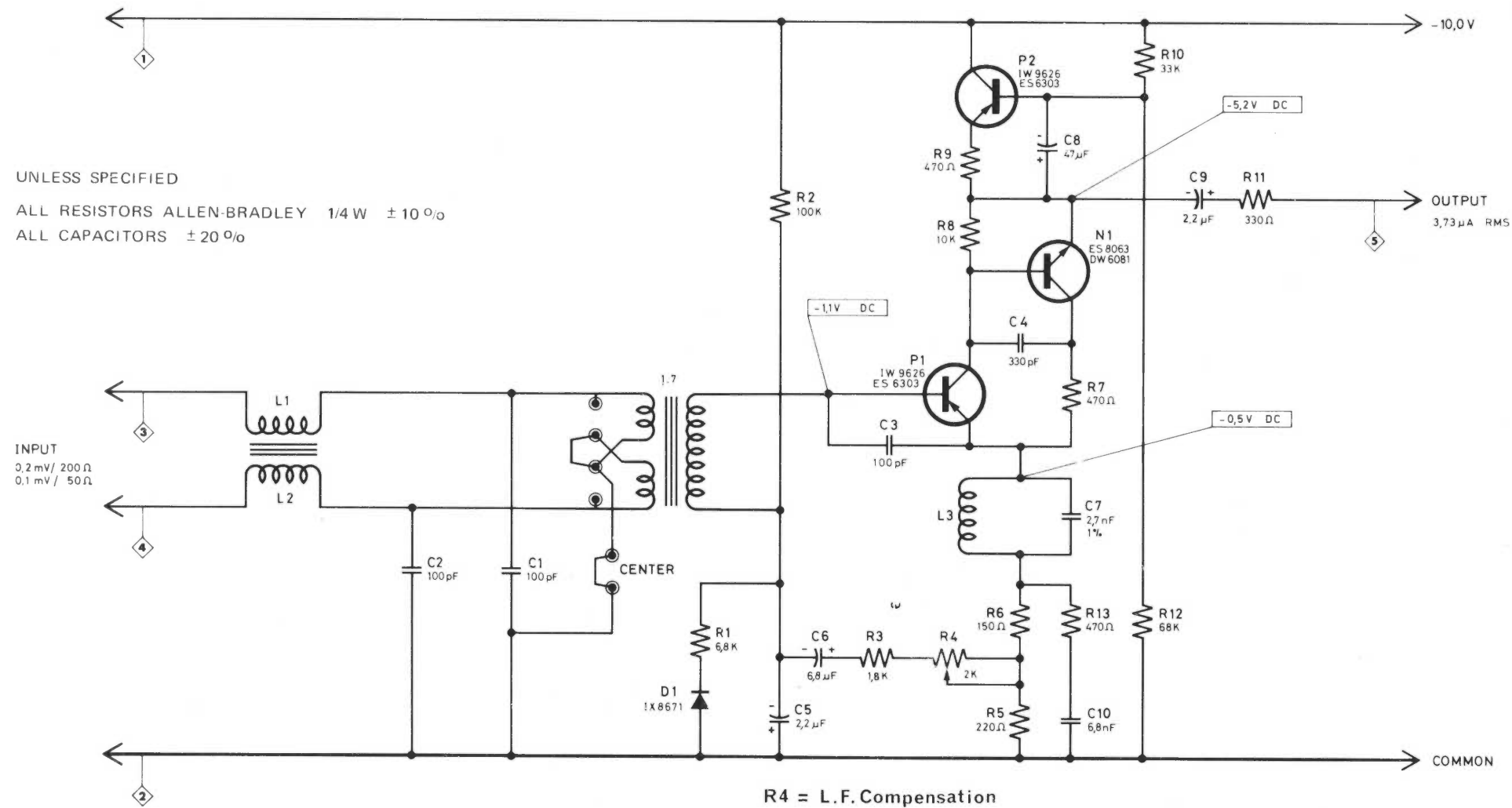
PART NUMBER : 09 04 734 0 01

Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	55 26 01 3682	6,8 kΩ	1/4W			10 %	Allen-Bradley	
R2	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R3	55 26 01 3182	1,8 kΩ	1/4W			10 %	Allen-Bradley	
R4	56 30 00 1202	2 kΩ			Variable	20 %	Dralowid	
R5	55 26 01 3221	220 Ω	1/4W			10 %	Allen-Bradley	
R6	55 26 01 3151	150 Ω	1/4W			10 %	Allen-Bradley	
R7	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R8	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R9	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R10	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R11	55 26 01 3331	330 Ω	1/4W			10 %	Allen-Bradley	
R12	55 26 01 3683	68 kΩ	1/4W			10 %	Allen-Bradley	
R13	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
CAPACITORS								
C1	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C2	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C3	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C4	53 32 04 8331	330 pF		Ceramic	500 V	20 %	ERIE	
C5	52 12 03 2250	2,2 μF	Electrolytic	Dry Tantalum	20 V	20 %	Sprague	
C6	52 12 01 6850	6,8 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C7	53 00 50 7272	2,7 nF		Polystyrene	125 V	1 %	Philips	
C8	52 12 01 4700	47 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C9	52 12 03 2250	2,2 μF	Electrolytic	Dry Tantalum	20 V	20 %	Sprague	
C10	53 22 60 7682	6,8 nF		Polyester	250 V	20 %	Hunts	
DIODES								
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
TRANSISTORS								
N1	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N1	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
INDUCTORS								
L1-L2	99 99 13 3090	Toroid	2P653 46	4C4 or 80K1			Philips or Siemens	
L3	99 99 13 3111	Ferroxcube	P11/7	3H1 or 3B7	μ' = 68		Philips	
TRANSFORMER								
	91 04 71 6001	Transformer	200 Ω				Kudelski	
	91 04 71 7001	Transformer	50 Ω				Kudelski	
CONNECTORS								
	01 04 77 0002	Pin Male					Kudelski	

UNLESS SPECIFIED

ALL RESISTORS ALLEN-BRADLEY 1/4 W $\pm 10\%$

ALL CAPACITORS $\pm 20\%$



$L_1 = L_2 = 10 \mu H \pm 30\%$ at 2,5 MHz
20 Turns $\phi 0,25$ mm

$L_3 = 0,65$ mH
84 Turns $\phi 0,2$ mm

MODIFICATIONS FOR THE QPSE XoY 1,5 VERSION

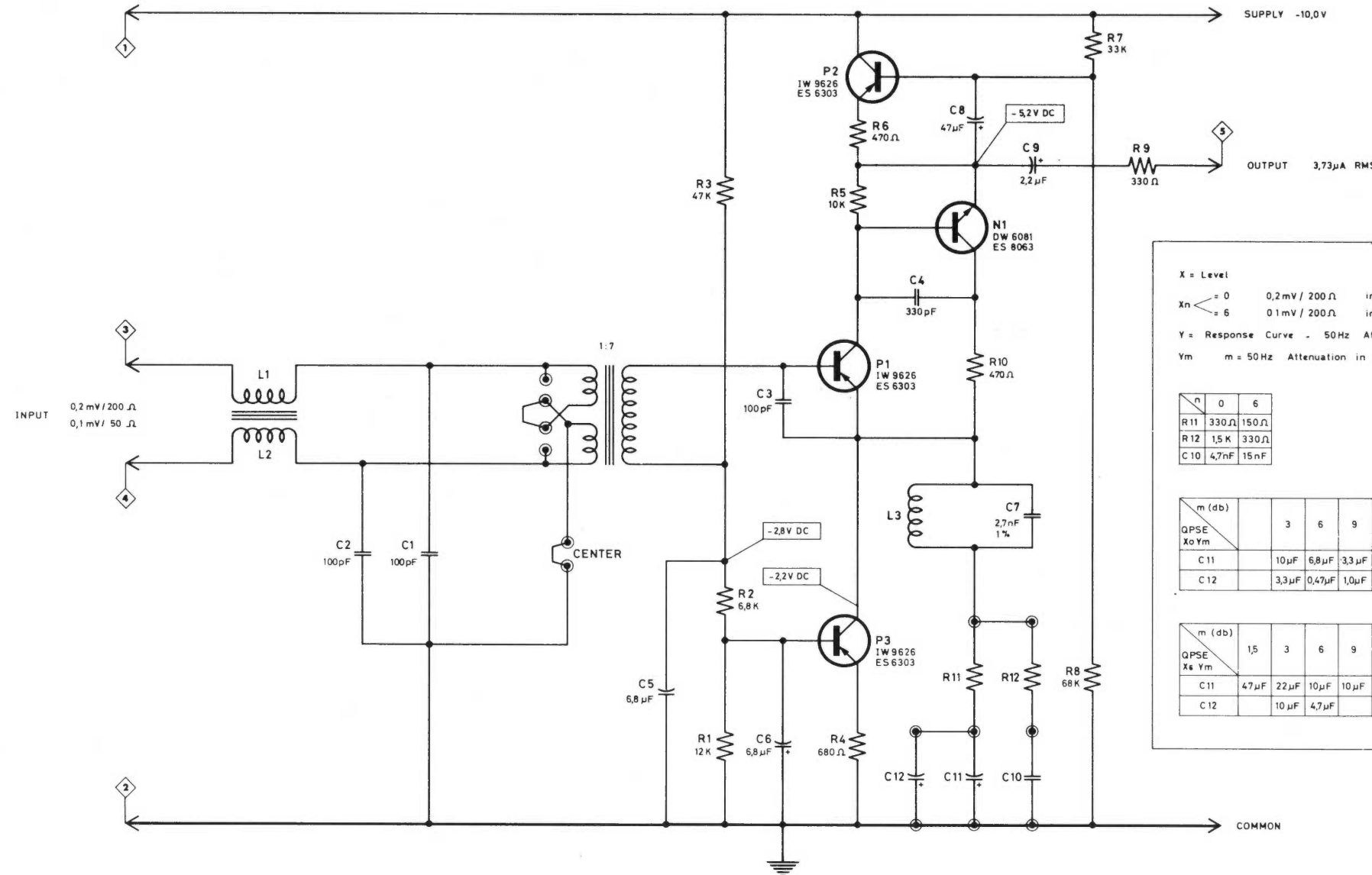
R_3 , R_4 , C_6 suppressed

Modification :	Valid from ser. N° :	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date : 6 11 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone : (212) 661-8066
CIRCUIT DIAGRAM :	MICROPHONE PREAMPLIFIER STANDARD 200 Ω or 50 Ω LINEAR (QPSE XoYo)	
Copy :	KUDELSKI	09 04 734 0 01

MICROPHONE PREAMPLIFIER QPSE X_n Y_m 200 Ω or 50 Ω

PART NUMBER : 09 04 744 0 01

Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3123	12 k Ω 1/4W	Allen-Bradley	
R2	55 26 01 3682	6,8 k Ω 1/4W	Allen-Bradley	
R3	55 26 01 3473	47 k Ω 1/4W	Allen-Bradley	
R4	55 26 01 3681	680 Ω 1/4W	Allen-Bradley	
R5	55 26 01 3103	10 k Ω 1/4W	Allen-Bradley	
R6	55 26 01 3471	470 Ω 1/4W	Allen-Bradley	
R7	55 26 01 3333	33 k Ω 1/4W	Allen-Bradley	
R8	55 26 01 3683	68 k Ω 1/4W	Allen-Bradley	
R9	55 26 01 3331	330 Ω 1/4W	Allen-Bradley	
R10	55 26 01 3471	470 Ω 1/4W	Allen-Bradley	
R11	55 26 01 3331	330 Ω 1/4W	Allen-Bradley	X ₀ Y _m only
R11	55 26 01 3151	150 Ω 1/4W	Allen-Bradley	X ₆ Y _m only
R12	55 26 01 3152	1,5 k Ω 1/4W	Allen-Bradley	X ₀ Y _m only
R12	55 26 01 3331	330 Ω 1/4W	Allen-Bradley	X ₆ Y _m only
CAPACITORS				
C1	53 32 04 8101	100 pF Ceramic	500 V 20 %	ERIE
C2	53 32 04 8101	100 pF Ceramic	500 V 20 %	ERIE
C3	53 32 04 8101	100 pF Ceramic	500 V 20 %	ERIE
C4	53 32 04 8331	330 pF Ceramic	500 V 20 %	ERIE
C5	52 12 01 6850	6,8 μ F Electrolytic	Dry Tantalum 6 V 20 %	Sprague
C6	52 12 01 6850	6,8 μ F Electrolytic	Dry Tantalum 6 V 20 %	Sprague
C7	53 00 50 7272	2,7 nF Polystyrene	125 V 1 %	Philips
C8	52 12 01 4700	47 μ F Electrolytic	Dry Tantalum 6 V 20 %	Sprague
C9	52 12 03 2250	2,2 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C10	53 22 60 7472	4,7 nF Polyester	250 V 20 %	Hunts
C10	53 22 60 7153	15 nF Polyester	250 V 20 %	Hunts
C11	52 12 03 1000	10 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C11	52 12 01 6850	6,8 μ F Electrolytic	Dry Tantalum 6 V 20 %	Sprague
C11	52 12 03 3350	3,3 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C11	52 12 03 2250	2,2 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C11	52 12 03 1850	1,8 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C11	52 12 01 4700	47 μ F Electrolytic	Dry Tantalum 6 V 20 %	Sprague
C11	52 12 03 2200	22 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C11	52 12 03 1000	10 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C11	52 12 03 1000	10 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C11	52 12 01 6850	6,8 μ F Electrolytic	Dry Tantalum 6 V 20 %	Sprague
C11	52 12 03 3350	3,3 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C12	52 12 03 3350	3,3 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C12	52 12 04 4750	0,47 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
C12	52 12 04 1050	1 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
C12	52 12 04 6860	0,68 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
C12	52 12 04 1560	0,15 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
C12	52 12 03 1000	10 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C12	52 12 02 4750	4,7 μ F Electrolytic	Dry Tantalum 10 V 20 %	Sprague
C12	52 12 04 1050	1 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P3	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P3	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
INDUCTORS				
L1-L2	99 99 13 3090	Toroid 2P653 46	4C4 or 80K1	Philips or Siemens
L3	99 99 13 3111	Ferroxcube P 11/7	3H1 or 3B7 $\mu' = 68$	Philips
TRANSFORMER				
	91 04 71 6000	Transformer 200 Ω		Kudelski
	91 04 71 7000	Transformer 50 Ω		Kudelski
CONNECTORS				
	01 04 78 0002	Pin Male		Kudelski



X = Level

Xn = 0 0,2 mV / 200 Ω input (ie 0 db)
 = 6 0,1 mV / 200 Ω input (ie -6 db)

Y = Response Curve - 50 Hz Attenuation

Ym m = 50 Hz Attenuation in db

n	0	6
R11	330 Ω	150 Ω
R12	1,5 K	330 Ω
C10	4,7 nF	15 nF

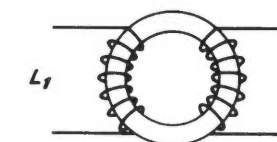
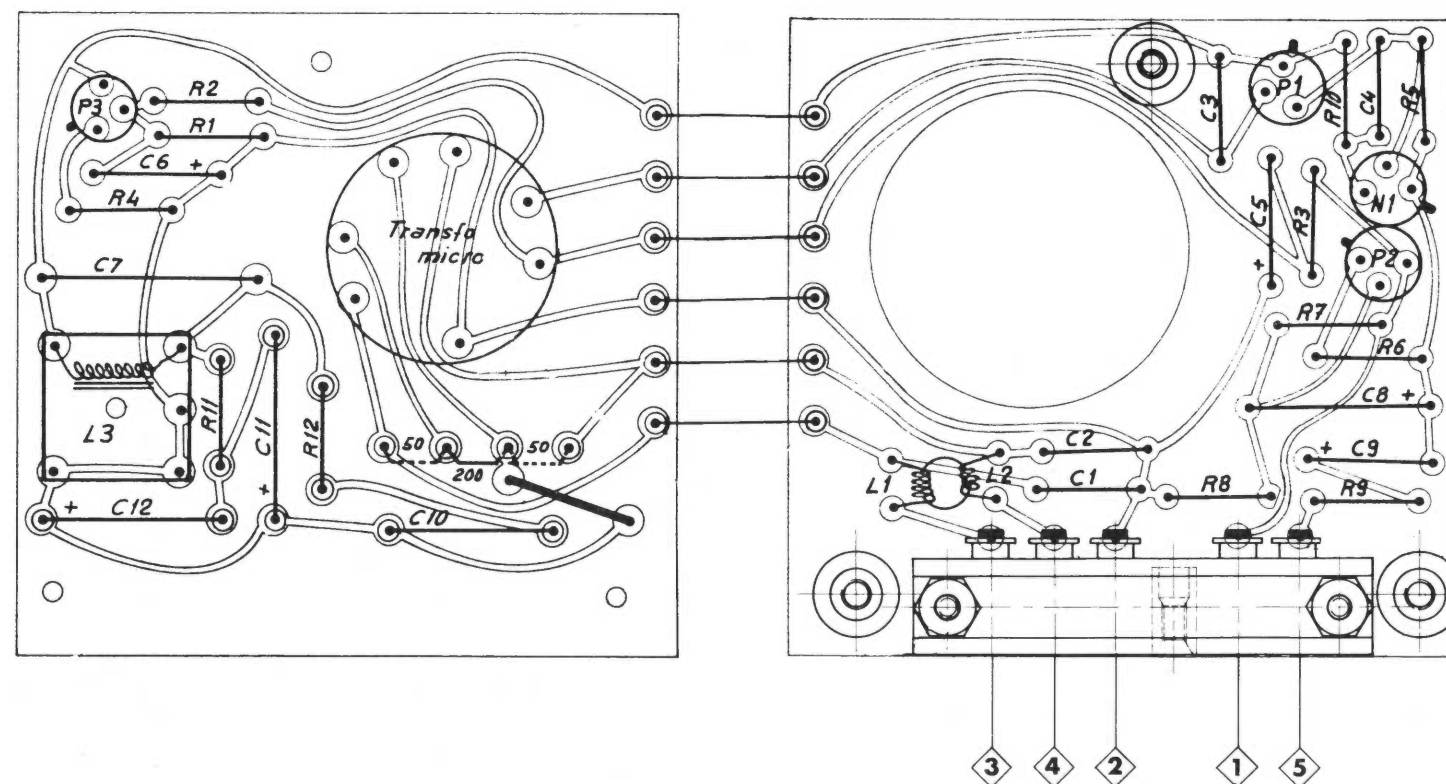
m (db)		3	6	9	12	15
QPSE						
Xo Ym						
C11		10 μF	6,8 μF	3,3 μF	2,2 μF	1,8 μF
C12		3,3 μF	0,47 μF	1,0 μF	0,68 μF	0,15 μF

m (db)	1,5	3	6	9	12	15
QPSE						
Xs Ym						
C11	4,7 μF	22 μF	10 μF	10 μF	6,8 μF	3,3 μF
C12		10 μF	4,7 μF			1,0 μF

UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W ± 10 %

ALL CAPACITORS ± 20 %



$L_2 = 10 \mu H \pm 30 \% \text{ at } 2,5 \text{ MHz}$
 20 Turns $\phi 0,25 \text{ mm}$

$L_3 = 0,65 \text{ mH}$
 84 Turns $\phi 0,2 \text{ mm}$

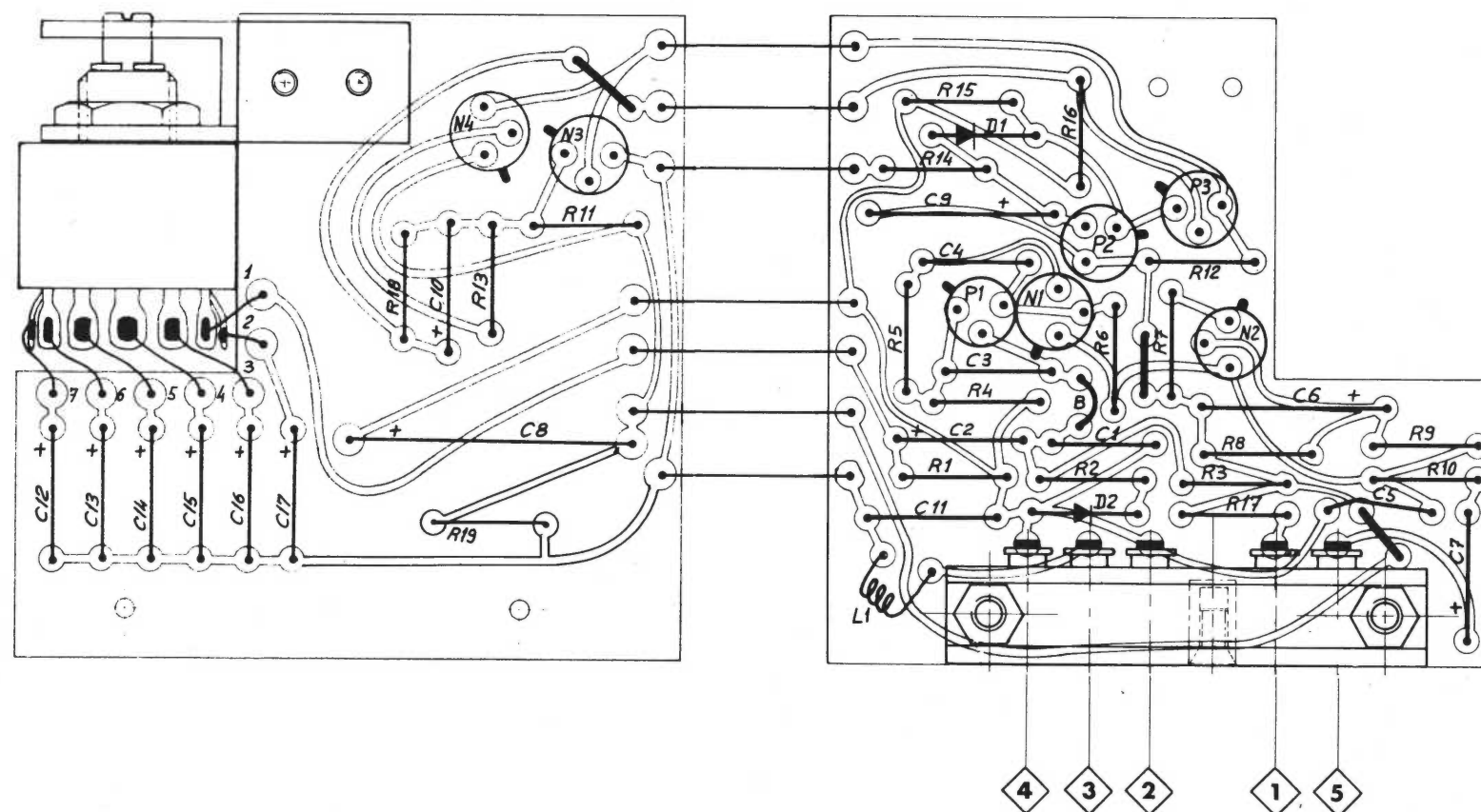
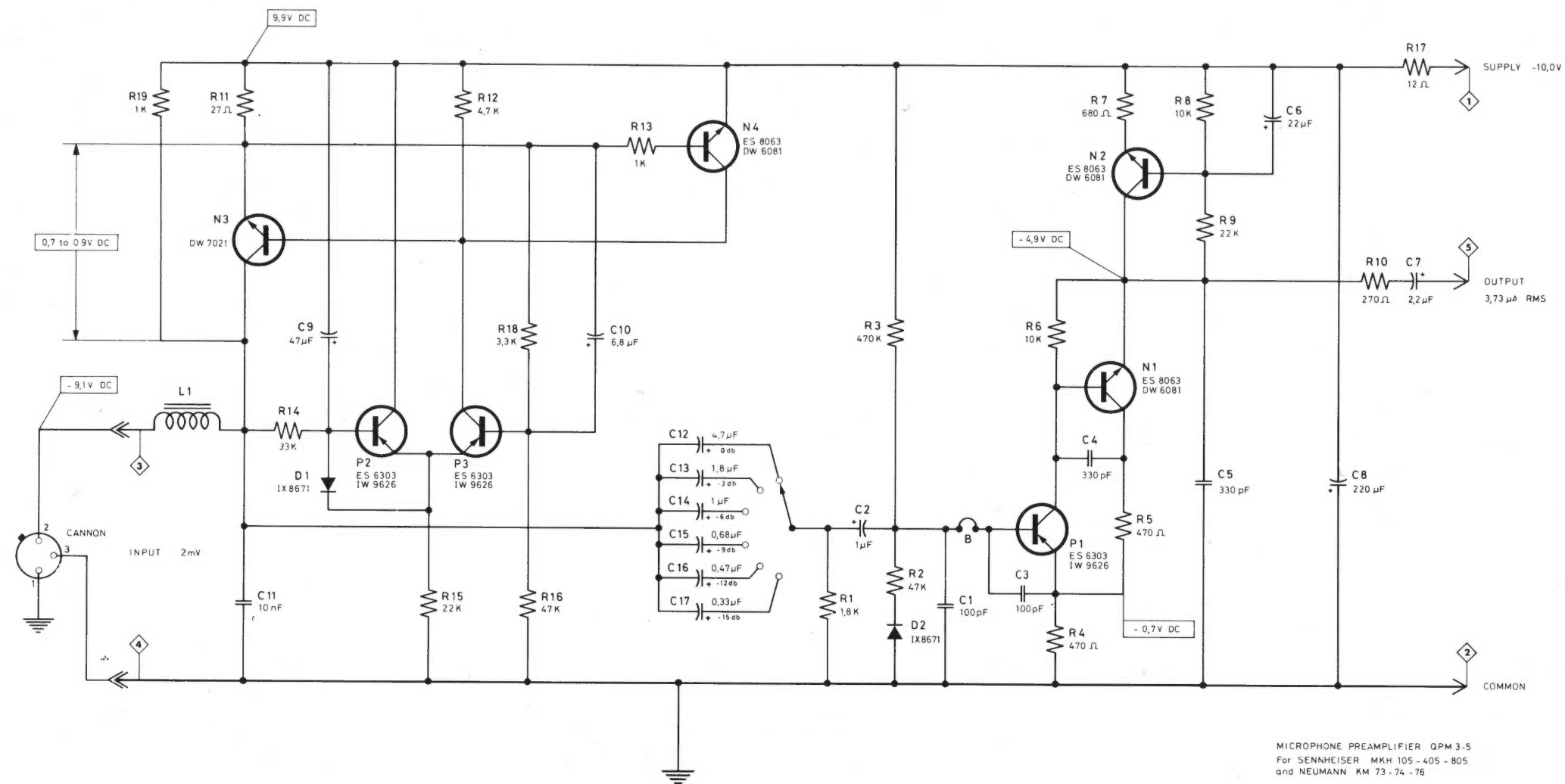
E4.6

Modification :	Valid from ser. N° :	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392 NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone (212) 641-8866
Date : 9 24 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	
CIRCUIT DIAGRAM : MICROPHONE PREAMPLIFIER		Drawn : []
QPSE Xn Ym 200 Ω or 50 Ω		Checked : []
Copy :		Printed : []
KUDELSKI		09 04 744 0 01

MICROPHONE PREAMPLIFIER QPM 3 - 5

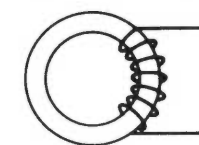
PART NUMBER : 09 04 747 0 01

Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3182	1,8 kΩ 1/4W	10 % Allen-Bradley	
R2	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R3	55 26 01 3474	470 kΩ 1/4W	10 % Allen-Bradley	
R4	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R5	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R6	55 26 01 3103	10 kΩ 1/4W	10 % Allen-Bradley	
R7	55 26 01 3681	680 Ω 1/4W	10 % Allen-Bradley	
R8	55 26 01 3103	10 kΩ 1/4W	10 % Allen-Bradley	
R9	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R10	55 26 01 3271	270 Ω 1/4W	10 % Allen-Bradley	
R11	55 26 01 3270	27 Ω 1/4W	10 % Allen-Bradley	
R12	55 26 01 3472	4,7 kΩ 1/4W	10 % Allen-Bradley	
R13	55 26 01 3102	1 kΩ 1/4W	10 % Allen-Bradley	
R14	55 26 01 3333	33 kΩ 1/4W	10 % Allen-Bradley	
R15	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R16	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R17	55 26 01 3120	12 Ω 1/4W	10 % Allen-Bradley	
R18	55 26 01 3332	3,3 kΩ 1/4W	10 % Allen-Bradley	
R19	55 26 01 3102	1 kΩ 1/4W	10 % Allen-Bradley	
CAPACITORS				
C1	53 32 04 8101	100 pF Ceramic	500 V 20 % ERIE	
C2	52 12 04 1050	1 μF Electrolytic Dry Tantalum	35 V 20 % Sprague	
C3	53 32 04 8101	100 pF Ceramic	500 V 20 % ERIE	
C4	53 32 04 8331	330 pF Ceramic	500 V 20 % ERIE	
C5	53 32 04 8331	330 pF Ceramic	500 V 20 % ERIE	
C6	52 12 03 2200	22 μF Electrolytic Dry Tantalum	15 V 20 % Sprague	
C7	52 12 03 2250	2,2 μF Electrolytic Dry Tantalum	15 V 20 % Sprague	
C8	52 12 02 2210	220 μF Electrolytic Dry Tantalum	10 V 20 % Sprague	
C9	52 12 01 4700	47 μF Electrolytic Dry Tantalum	6 V 20 % Sprague	
C10	52 12 01 6850	6,8 μF Electrolytic Dry Tantalum	6 V 20 % Sprague	
C11	53 22 60 7103	10 nF Polyester	250 V 20 % Hunts	
C12	52 12 02 4750	4,7 μF Electrolytic Dry Tantalum	10 V 20 % Sprague	
C13	52 12 03 1850	1,8 μF Electrolytic Dry Tantalum	20 V 20 % Sprague	
C14	52 12 04 1050	1 μF Electrolytic Dry Tantalum	35 V 20 % Sprague	
C15	52 12 04 6860	0,68 μF Electrolytic Dry Tantalum	35 V 20 % Sprague	
C16	52 12 04 4760	0,47 μF Electrolytic Dry Tantalum	35 V 20 % Sprague	
C17	52 12 04 3360	0,33 μF Electrolytic Dry Tantalum	35 V 20 % Sprague	
DIODES				
D1	51 01 00 2000	Silicon IX8671	SGS or 1N4148 Sylvania	SGS or Sylvania
D2	51 01 00 2000	Silicon IX8671	SGS or 1N4148 Sylvania	SGS or Sylvania
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N2	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N2	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N3	50 01 00 3060	Silicon NPN DW7021	Factory Selected (Replaceable by 2N3302)	SGS-Fairchild
N4	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N4	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P3	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P3	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
INDUCTORS				
L1	99 99 13 3080	Toroid 2P653 46	4C4 or 80K1	Philips or Siemens
CONNECTORS				
	01 04 78 0002	Pin Male		Kudelski



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W ± 10 %
ALL CAPACITORS ± 20 %



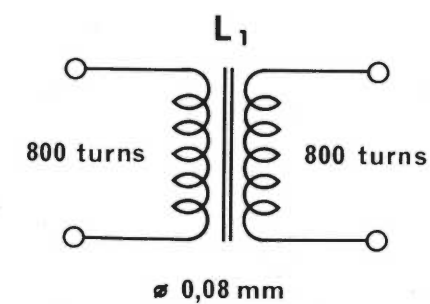
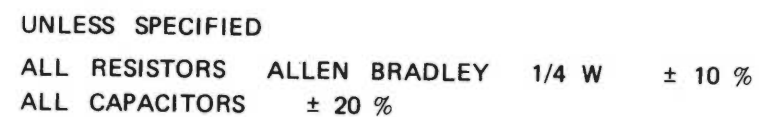
$L_1 = 10 \mu H \pm 30\%$ at 2,5 MHz
20 Turns ϕ 0,25 mm

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 7 29 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 661-8000
CIRCUIT DIAGRAM:		
MICROPHONE PREAMPLIFIER QPM 3-5		
Copy:	KUDELSKI	09 04 747 0 01

LINE SYMMETRICAL PREAMPLIFIER QPM 6

PART NUMBER : 09 04 795 0 01

Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 27 18 3472	4,7 kΩ 1/4W TR5 200 ppm 2 %	Electrosil	
R2	55 27 18 3472	4,7 kΩ 1/4W TR5 200 ppm 2 %	Electrosil	
R3	55 26 01 3471	470 Ω 1/4W 10 %	Allen-Bradley	
R4	55 26 01 3471	470 Ω 1/4W 10 %	Allen-Bradley	
R5	55 26 01 3183	18 kΩ 1/4W 10 %	Allen-Bradley	
R6	55 26 01 3104	100 kΩ 1/4W 10 %	Allen-Bradley	
R7	55 26 01 3103	10 kΩ 1/4W 10 %	Allen-Bradley	
R8	55 26 01 3471	470 Ω 1/4W 10 %	Allen-Bradley	
R9	55 26 01 3683	68 kΩ 1/4W 10 %	Allen-Bradley	
R10	55 26 01 3273	27 kΩ 1/4W 10 %	Allen-Bradley	
R11	55 26 01 3221	220 Ω 1/4W 10 %	Allen-Bradley	
R12	55 26 01 3471	470 Ω 1/4W 10 %	Allen-Bradley	
R13	55 26 01 3471	470 Ω 1/4W 10 %	Allen-Bradley	
CAPACITORS				
C1	53 21 47 4105	1 μF Polycarbonate 25 V 10 %	Fribourg	
C2	53 22 60 7223	22 nF Polyester 250 V 20 %	Hunts	
C3	53 22 60 7223	22 nF Polyester 250 V 20 %	Hunts	
C4	52 12 02 4750	4,7 μF Electrolytic Dry Tantalum 10 V 20 %	Sprague	
C5	53 32 04 8331	330 pF Ceramic 500 V 20 %	ERIE	
C6	53 32 04 8301	100 pF Ceramic 500 V 20 %	ERIE	
C7	52 12 01 4700	47 μF Electrolytic Dry Tantalum 6 V 20 %	Sprague	
C8	52 12 02 4750	4,7 μF Electrolytic Dry Tantalum 10 V 20 %	Sprague	
C9	54 00 31 2180	2-18,5 pF Trimmer Film plastic 50 V 20 %	Philips	
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081 Factory Selected (Replaceable by 2N2484)	SGS-Fairchild	
N1	50 09 00 3000	Silicon NPN ES8063 Factory Selected (Replaceable by 2N2484)	Motorola	
P1	50 01 00 2000	Silicon PNP IW9626 Factory Selected (Replaceable by 2N3962)	SGS-Fairchild	
P1	50 09 00 2000	Silicon PNP ES6303 Factory Selected (Replaceable by 2N3962)	Motorola	
P2	50 01 00 2000	Silicon PNP IW9626 Factory Selected (Replaceable by 2N3962)	SGS-Fairchild	
P2	50 09 00 2000	Silicon PNP ES6303 Factory Selected (Replaceable by 2N3962)	Motorola	
INDUCTORS				
L1	99 99 11 3030	Ferroxcube P18/11 3H1 or 3B7 μ' = 1310	Philips	
L2	99 99 13 3300	Ferroxcube P11/7 3H1 or 3B7 μ' = 68	Philips	
CONNECTORS				
	01 04 78 0002	Pin Male	Kudelski	



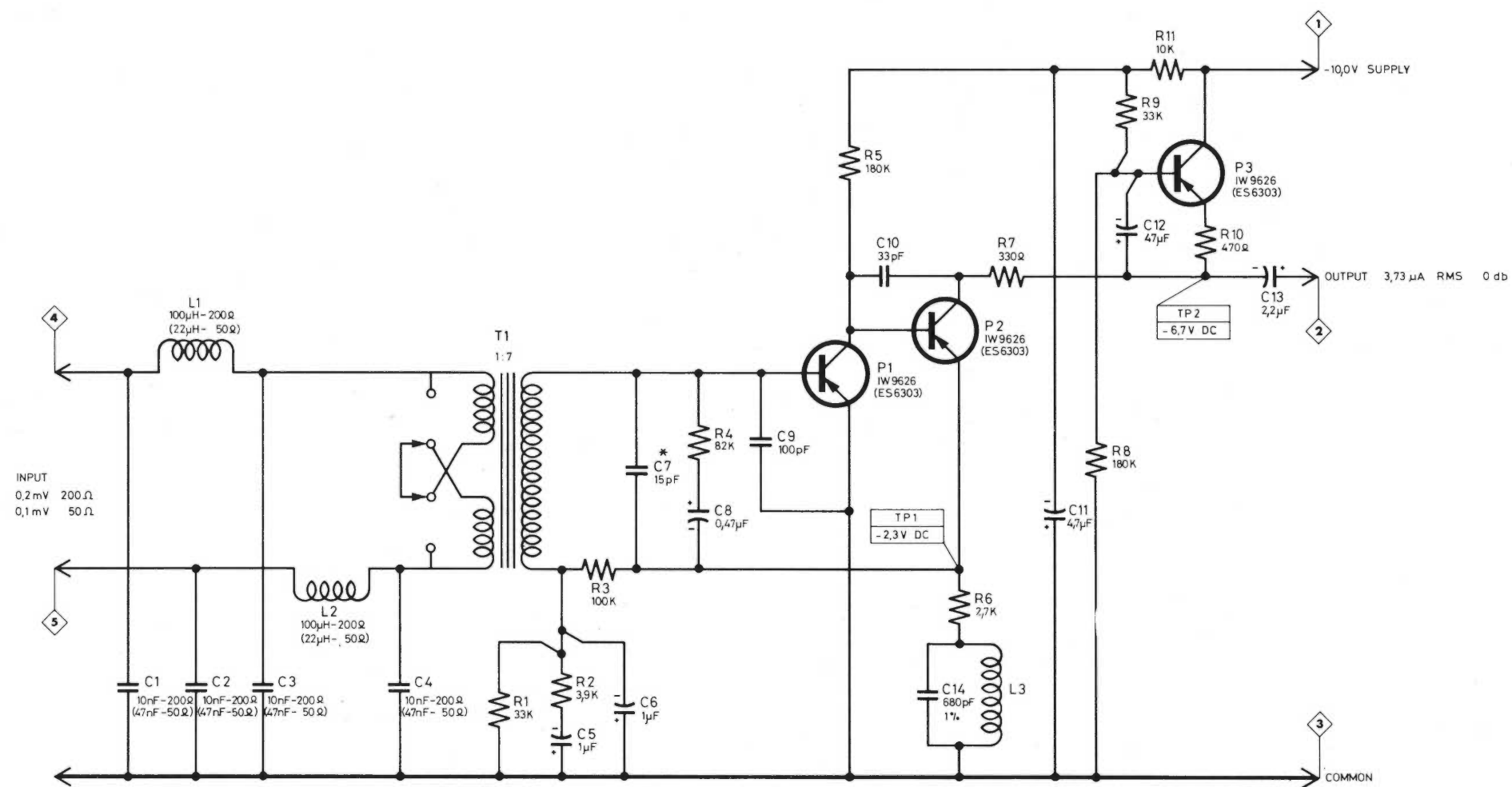
$L_2 = 2,6 \text{ mH}$
171 Turns ϕ 0,12 mm

Modification :	Valid from ser. N° :	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392 NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 681-8966
	This drawing is confidential and may not be divulged in whole or in part to a third party.	
Date : 9 16 70		
CIRCUIT DIAGRAM :		Drawn ☒ Controlled ☒ Checked ☒ Printed ☒
LINE SYMMETRICAL PREAMPLIFIER QPM 6		
Copy :	KUDELSKI	09 04 795 0 01

MICROPHONE PREAMPLIFIER QPSI 200 Ω or 50 Ω

PART NUMBER : 09 04 725 0 01

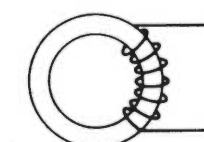
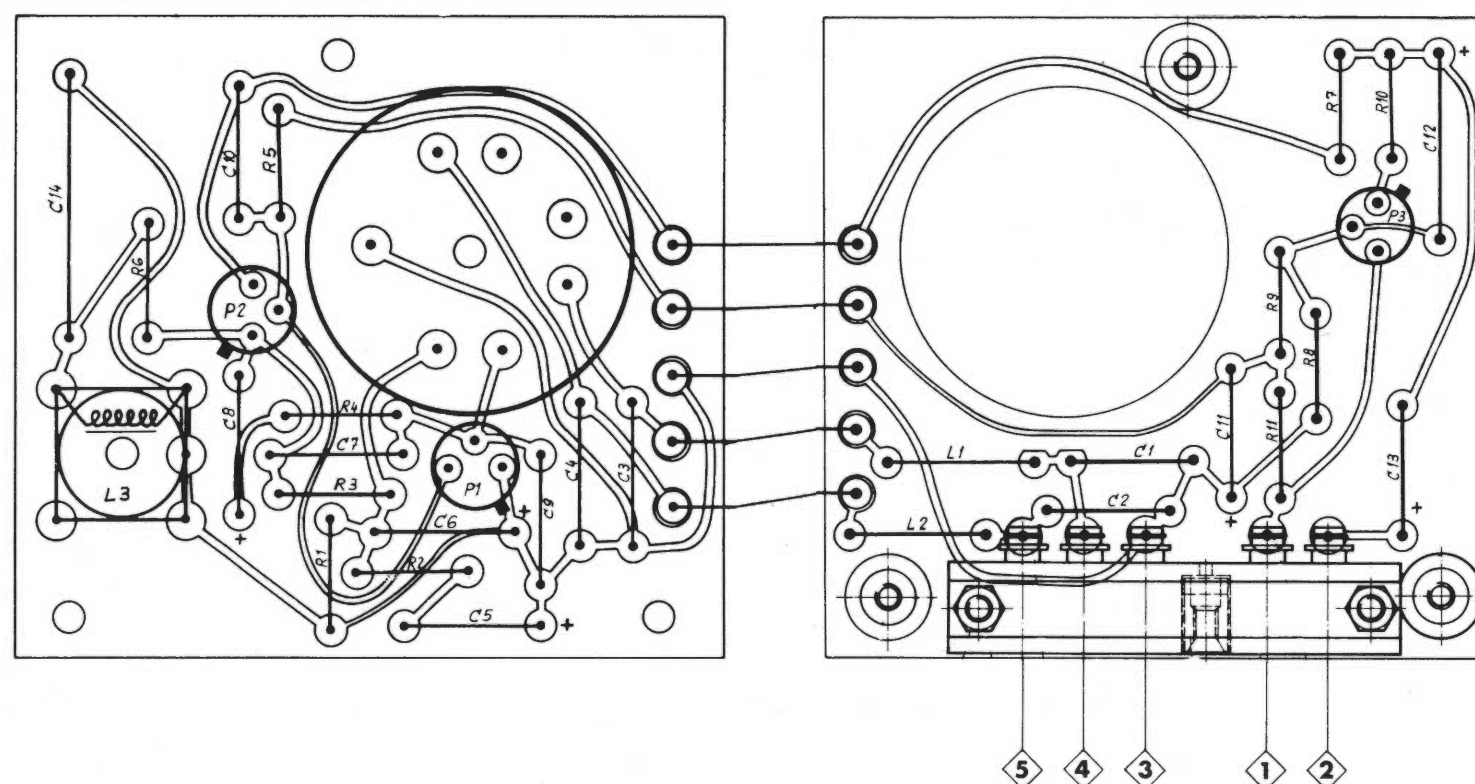
Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3333	33 k Ω 1/4W	10 %	Allen-Bradley
R2	55 26 01 3392	3,9 k Ω 1/4W	10 %	Allen-Bradley
R3	55 26 01 3104	100 k Ω 1/4W	10 %	Allen-Bradley
R4	55 26 01 3823	82 k Ω 1/4W	10 %	Allen-Bradley
R5	55 26 01 3184	180 k Ω 1/4W	10 %	Allen-Bradley
R6	55 26 01 3272	2,7 k Ω 1/4W	10 %	Allen-Bradley
R7	55 26 01 3331	330 Ω 1/4W	10 %	Allen-Bradley
R8	55 26 01 3184	180 k Ω 1/4W	10 %	Allen-Bradley
R9	55 26 01 3333	33 k Ω 1/4W	10 %	Allen-Bradley
R10	55 26 01 3471	470 Ω 1/4W	10 %	Allen-Bradley
R11	55 26 01 3103	10 k Ω 1/4W	10 %	Allen-Bradley
CAPACITORS				
C1	53 22 60 7103	10 nF Polyester	250 V 20 %	Hunts
C2	53 22 60 7103	10 nF Polyester	250 V 20 %	Hunts
C3	53 22 60 7103	10 nF Polyester	250 V 20 %	Hunts
C4	53 22 60 7103	10 nF Polyester	250 V 20 %	Hunts
C5	52 12 04 1050	1 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
C6	52 12 04 1050	1 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
C7	53 32 04 8150	15 pF Ceramic	500 V 20 %	ERIE
C8	52 12 04 4760	0,47 μ F Electrolytic	Dry Tantalum 35 V 20 %	Sprague
C9	53 32 04 8101	100 pF Ceramic	500 V 20 %	ERIE
C10	53 32 04 8330	33 pF Ceramic	500 V 20 %	ERIE
C11	52 12 02 4750	4,7 μ F Electrolytic	Dry Tantalum 10 V 20 %	Sprague
C12	52 12 01 4700	47 μ F Electrolytic	Dry Tantalum 6 V 20 %	Sprague
C13	52 12 03 2250	2,2 μ F Electrolytic	Dry Tantalum 20 V 20 %	Sprague
C14	53 00 50 8681	680 pF Polystyrene	500 V 1 %	Philips
TRANSISTORS				
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P3	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P3	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
INDUCTORS				
L1	99 99 13 3090	Toroid 2P653 46	4C4 or 80K1	Philips or Siemens
L2	99 99 13 3090	Toroid 2P653 46	4C4 or 80K1	Philips or Siemens
L3	99 99 13 3110	Ferroxcube P11/7	3H1 or 3B7 $\mu' = 68$	Philips
TRANSFORMER				
	91 04 71 6000	Transformer 200 Ω		Kudelski
	91 04 71 7000	Transformer 50 Ω		Kudelski
CONNECTORS				
	01 04 78 0002	Pin Male		Kudelski



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$

ALL CAPACITORS $\pm 20\%$



$L_1 = L_2 = 10 \mu H \pm 30\%$ at 2,5 MHz
20 Turns $\phi 0,25 \text{ mm}$

$L_3 = 2,6 \text{ mH}$ at 120 kHz

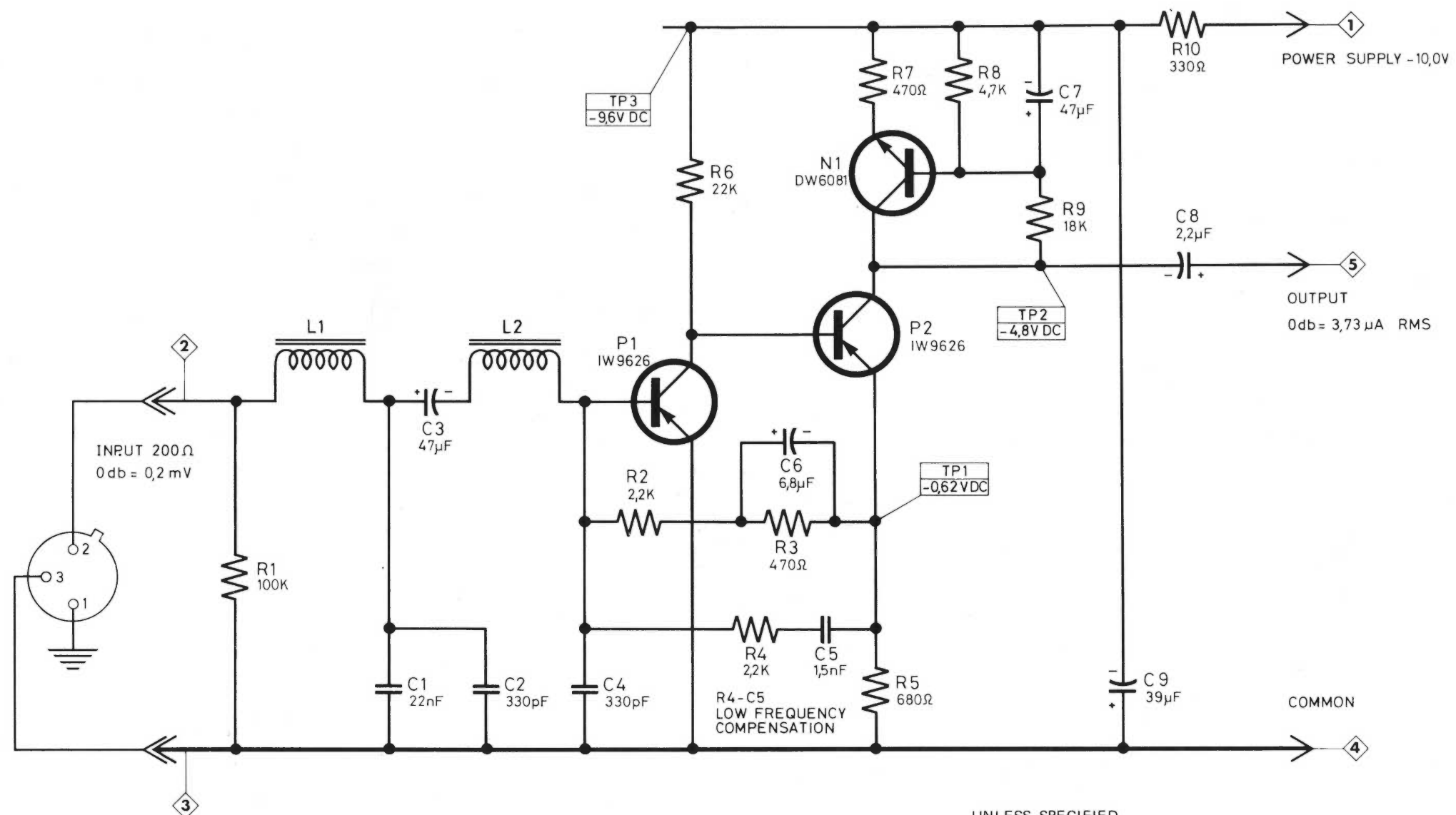
E4.9

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 9 18 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone (212) 661-8066
CIRCUIT DIAGRAM:	MICROPHONE PREAMPLIFIER QPSI 200 Ω or 50 Ω	
Copy:	KUDELSKI	09 04 725 0 01

MICROPHONE PREAMPLIFIER QPAI 200

PART NUMBER : 09 04 706 0 01

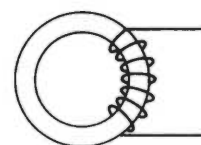
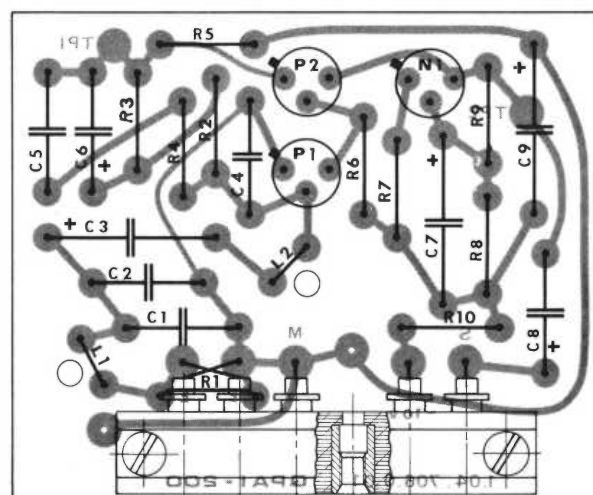
Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R2	55 26 01 3222	2,2 kΩ 1/4W	10 % Allen-Bradley	
R3	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R4	55 26 01 3222	2,2 kΩ 1/4W	10 % Allen-Bradley	
R5	55 26 01 3681	680 Ω 1/4W	10 % Allen-Bradley	
R6	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R7	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R8	55 26 01 3472	4,7 kΩ 1/4W	10 % Allen-Bradley	
R9	55 26 01 3183	18 kΩ 1/4W	10 % Allen-Bradley	
R10	55 26 01 3331	330 Ω 1/4W	10 % Allen-Bradley	
CAPACITORS				
C1	53 00 32 7223	22 nF Polyester	250 V 10 % Philips	
C2	53 32 04 8331	330 pF Ceramic	500 V 20 % ERIE	
C3	52 12 01 4700	47 μF Electrolytic	Dry Tantalum 6 V 20 % Sprague	
C4	53 32 04 8331	330 pF Ceramic	500 V 20 % ERIE	
C5	53 22 60 8152	1,5 nF Polyester	500 V 20 % Hunts	
C6	52 12 01 6850	6,8 μF Electrolytic	Dry Tantalum 6 V 20 % Sprague	
C7	52 12 01 4700	47 μF Electrolytic	Dry Tantalum 6 V 20 % Sprague	
C8	52 12 03 2250	2,2 μF Electrolytic	Dry Tantalum 20 V 20 % Sprague	
C9	52 12 02 3900	39 μF Electrolytic	Dry Tantalum 10 V 20 % Sprague	
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 3000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
INDUCTORS				
L1	99 99 13 3080	Toroid 2P653 46-	4C4 or 80K1	Philips or Siemens
L2	99 99 13 3070	Toroid 2P653 30	3E2 or N28 or N22	Philips or Siemens
CONNECTORS				
	01 04 770 002	Pin Male		Kudelski



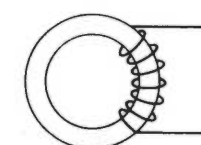
UNLESS SPECIFIED

ALL RESISTORS ALLEN-BRADLEY 1/4 W ± 10 %

ALL CAPACITORS ± 20 %



$L_1 = 10 \mu H \pm 30\%$ at 2,5 MHz
20 Turns ϕ 0,25 mm



$L_2 = 1,5 mH \pm 30\%$ at 1 KHz
30 Turns ϕ 0,25 mm

QPAI 200 MODIFICATION FOR NAGRA IV A & AL

R_4, C_5, C_6 suppressed — $R_3 = 0$ — $R_2 = 3,3 k\Omega$

$C_3 = 33 \mu F$

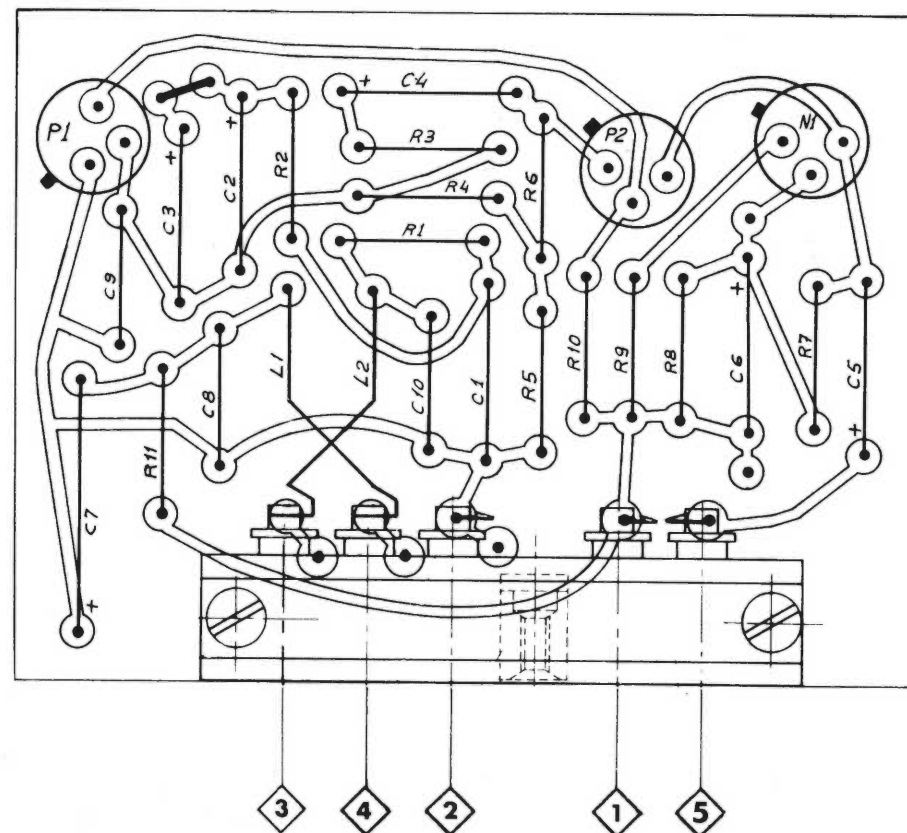
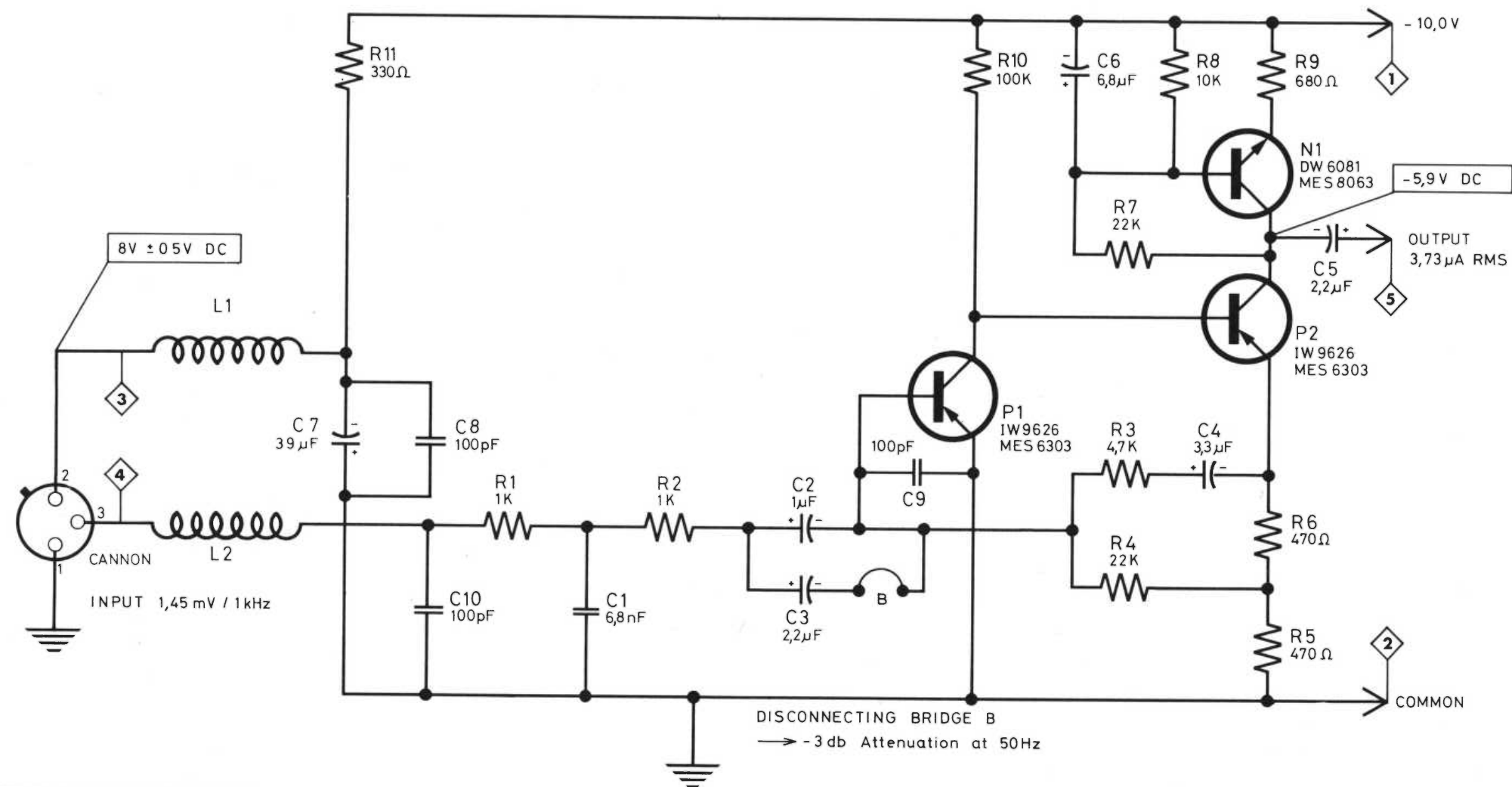
Modification :	Valid from ser. N° :	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392 NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 661-8066
Date : 5. 18. 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	Drawn : <i>[Signature]</i> Controlled : <i>[Signature]</i> Checked : <i>[Signature]</i> Printed : <i>[Signature]</i>
CIRCUIT DIAGRAM :		
MICROPHONE PREAMPLIFIER QPAI 200 NAGRA IV		
Copy :	KUDELSKI	09 04 706 0 01

E4.10

MICROPHONE PREAMPLIFIER FOR SENNHEISER MKH 104 - 404 - 804 - QPM 3-4

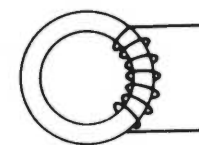
PART NUMBER : 09 04 745 0 01

Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3102	1 k Ω 1/4W	10 % Allen-Bradley	
R2	55 26 01 3102	1 k Ω 1/4W	10 % Allen-Bradley	
R3	55 26 01 3472	4,7 k Ω 1/4W	10 % Allen-Bradley	
R4	55 26 01 3223	22 k Ω 1/4W	10 % Allen-Bradley	
R5	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R6	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R7	55 26 01 3223	22 k Ω 1/4W	10 % Allen-Bradley	
R8	55 26 01 3103	10 k Ω 1/4W	10 % Allen-Bradley	
R9	55 26 01 3681	680 Ω 1/4W	10 % Allen-Bradley	
R10	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R11	55 26 01 3331	330 Ω 1/4W	10 % Allen-Bradley	
CAPACITORS				
C1	53 22 60 7682	6,8 nF Polyester	250 V 20 % Hunts	
C2	52 12 04 1050	1 μ F Electrolytic	Dry Tantalum 35 V 20 % Sprague	
C3	52 12 03 2250	2,2 μ F Electrolytic	Dry Tantalum 20 V 20 % Sprague	
C4	52 12 03 3350	3,3 μ F Electrolytic	Dry Tantalum 20 V 20 % Sprague	
C5	52 12 03 2250	2,2 μ F Electrolytic	Dry Tantalum 20 V 20 % Sprague	
C6	52 12 01 6850	6,8 μ F Electrolytic	Dry Tantalum 6 V 20 % Sprague	
C7	52 12 02 3900	39 μ F Electrolytic	Dry Tantalum 10 V 20 % Sprague	
C8	53 32 04 8101	100 pF Ceramic	500 V 20 % ERIE	
C9	53 32 04 8101	100 pF Ceramic	500 V 20 % ERIE	
C10	53 32 04 8101	100 pF Ceramic	500 V 20 % ERIE	
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N2	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N2	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
INDUCTORS				
L1	99 99 13 3080	Toroid 2P653 46	4C4 or 80K1	Philips or Siemens
L2	99 99 13 3080	Toroid 2P653 46	4C4 or 80K1	Philips or Siemens
CONNECTORS				
	01 04 78 0002	Pin Male		Kudelski



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$
ALL CAPACITORS $\pm 20\%$



$L_1 = L_2 = 10 \mu\text{H} \pm 30\%$ at 2.5 MHz
20 Turns $\phi 0.25 \text{ mm}$

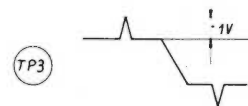
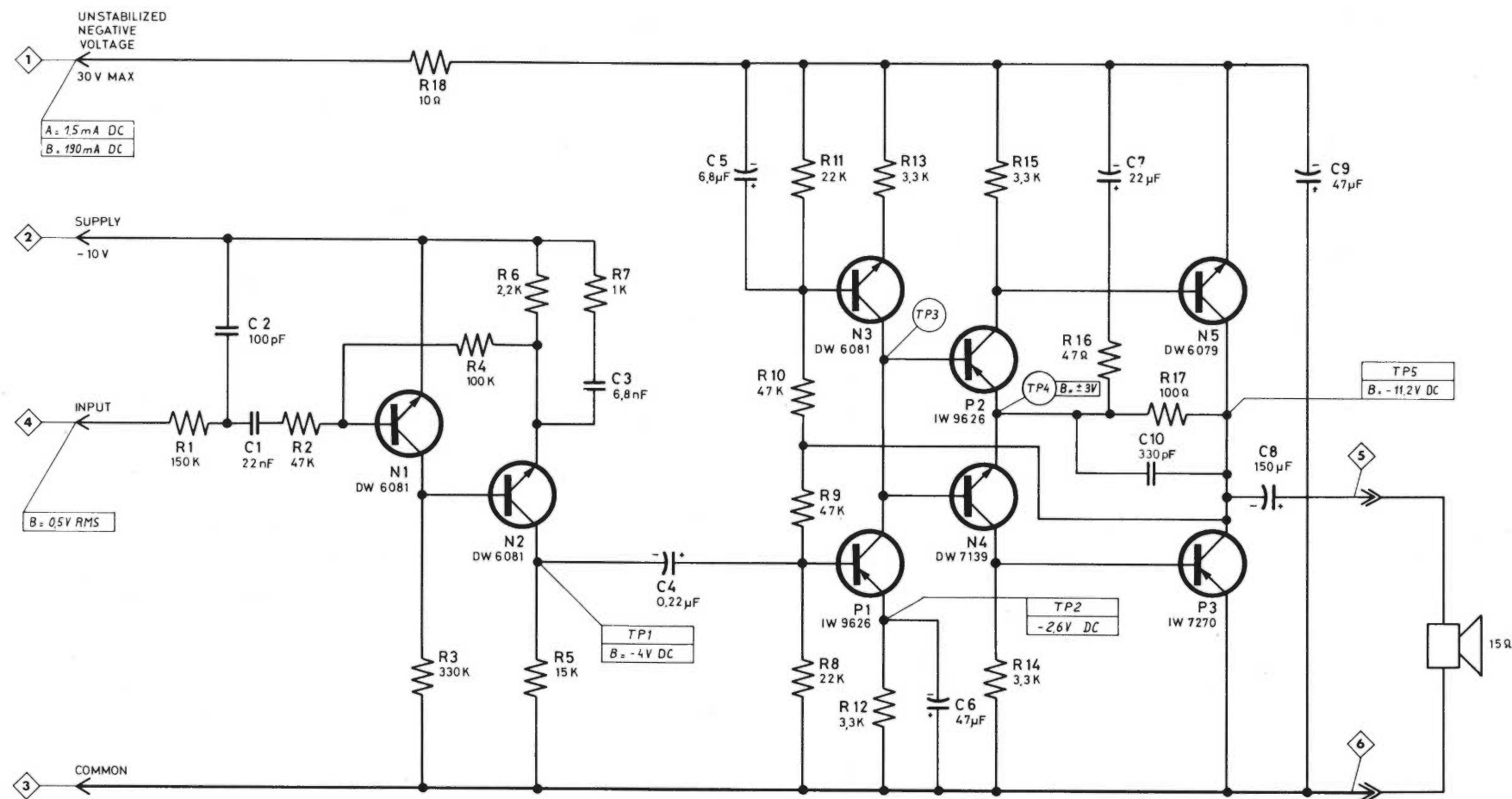
E4.11

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 7 28 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 661-8086
CIRCUIT DIAGRAM: MICROPHONE PREAMPLIFIER		
QPM3-4 FOR SENNHEISER MKH104-404-804		
Copy:	KUDELSKI	09 04 745 0 01

L. S. AMPLIFIER

PART NUMBER : 09 04 760 0 01

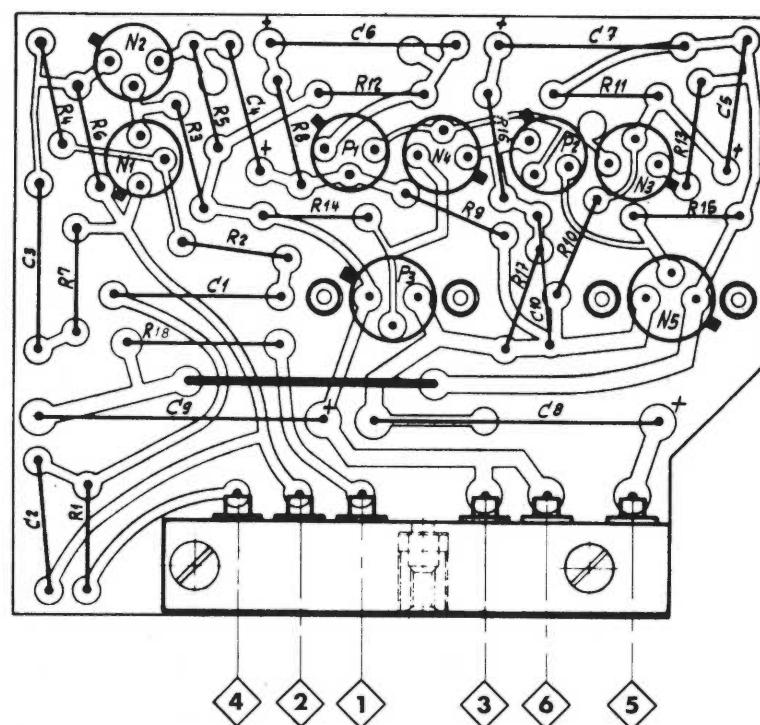
Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3154	150 kΩ 1/4W	10 % Allen-Bradley	
R2	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R3	55 26 01 3334	330 kΩ 1/4W	10 % Allen-Bradley	
R4	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R5	55 26 01 3153	15 kΩ 1/4W	10 % Allen-Bradley	
R6	55 26 01 3222	2,2 kΩ 1/4W	10 % Allen-Bradley	
R7	55 26 01 3102	1 kΩ 1/4W	10 % Allen-Bradley	
R8	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R9	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R10	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R11	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R12	55 26 01 3332	3,3 kΩ 1/4W	10 % Allen-Bradley	
R13	55 26 01 3332	3,3 kΩ 1/4W	10 % Allen-Bradley	
R14	55 26 01 3332	3,3 kΩ 1/4W	10 % Allen-Bradley	
R15	55 26 01 3332	3,3 kΩ 1/4W	10 % Allen-Bradley	
R16	55 26 01 3470	47 Ω 1/4W	10 % Allen-Bradley	
R17	55 26 01 3101	100 Ω 1/4W	10 % Allen-Bradley	
R18	55 26 01 4100	10 Ω 1/4W	10 % Allen-Bradley	
CAPACITORS				
C1	53 22 60 7223	22 nF Polyester	250 V 20 % Hunts	
C2	53 22 60 9101	100 pF Polyester	750 V 20 % Hunts	
C3	53 22 60 7682	6,8 nF Polyester	250 V 20 % Hunts	
C4	52 12 04 2260	0,22 μF Electrolytic	Dry Tantalum 35 V 20 % Sprague	
C5	52 12 01 6850	6,8 μF Electrolytic	Dry Tantalum 6 V 20 % Sprague	
C6	52 12 01 4700	47 μF Electrolytic	Dry Tantalum 6 V 20 % Sprague	
C7	52 12 03 2200	22 μF Electrolytic	Dry Tantalum 15 V 20 % Sprague	
C8	52 12 03 1510	150 μF Electrolytic	Dry Tantalum 15 V 20 % Sprague	
C9	52 12 04 4700	47 μF Electrolytic	Dry Tantalum 35 V 20 % Sprague	
C10	53 32 04 8331	330 pF Ceramic	500 V 20 % ERIE	
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N2	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N2	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N3	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N3	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N4	50 01 00 3100	Silicon NPN DW7139	Factory Selected	SGS-Fairchild
N5	50 01 00 3090	Silicon NPN DW6079	Factory Selected (Replaceable by 2N3109)	SGS-Fairchild
N5	50 09 00 3010	Silicon NPN ES8070	Factory Selected (Replaceable by 2N3109)	Motorola
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P3	50 01 00 2100	Silicon PNP DW7270	Factory Selected (Replaceable by 2N4030)	SGS-Fairchild
P3	50 09 00 2030	Silicon PNP ES8073	Factory Selected (Replaceable by 2N4030)	Motorola
CONNECTORS				
	01 04 78 0002	Pin Male	Kudelski	



Unstabilized negative voltage
Mode A = -24.0 V DC, open circuit
Mode B = -22.0 V DC, 6 V RMS/1 kHz Output

UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W ± 10 %
ALL CAPACITORS ± 20 %



Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX
	This drawing is confidential and may not be divulged in whole or in part to a third party.	CH 1033 Switzerland - Telex 24 392
Date: 6 24 70		NAGRA MAGNETIC RECORDERS INC.
		19 West 44th Street - New York N.Y. 10036
		Phone: (212) 681-8066
CIRCUIT DIAGRAM:	L. S. AMPLIFIER	Drawn: J. A.
Copy:	KUDELSKI	Checked: J. A.
		Printed: J. A.
		09 04 760 0 01

E4.12

AUTOMATIC LEVEL CONTROL

PART NUMBER : 09 04 730 0 01

AUTOMATIC LEVEL CONTROL

PART NUMBER : 09 04 730 0 01

Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3274	270 k Ω 1/4W	10 % Allen-Bradley	
R2	55 26 01 3105	1 M Ω 1/4W	10 % Allen-Bradley	
R3	55 26 01 3332	3,3 k Ω 1/4W	10 % Allen-Bradley	
R4	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R5	55 26 01 3103	10 k Ω 1/4W	10 % Allen-Bradley	
R6	55 26 01 3102	1 k Ω 1/4W	10 % Allen-Bradley	
R7	55 27 18 3223	22 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R8	55 27 18 3223	22 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R9	56 31 00 1503	50 k Ω	Variable 20 % Ruwido or Dralowid	
R10	55 27 18 3104	100 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R11	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R12	55 27 18 3274	270 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R13	55 26 01 3333	33 k Ω 1/4W	10 % Allen-Bradley	
R14	55 26 01 3122	1,2 k Ω 1/4W	10 % Allen-Bradley	
R15	55 27 18 3103	10 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R16	55 27 18 3103	10 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R17	55 26 01 3333	33 k Ω 1/4W	10 % Allen-Bradley	
R18	55 26 01 3274	270 k Ω 1/4W	10 % Allen-Bradley	
R19	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R20	55 27 18 3103	10 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R21	55 27 18 3473	47 k Ω 1/4W	TR5 300 ppm 2 % Electrosil	
R22	55 26 01 3224	220 k Ω 1/4W	10 % Allen-Bradley	
R23	55 26 01 3224	220 k Ω 1/4W	10 % Allen-Bradley	
R24	55 00 95 0472	4,7 k Ω	NTC 20 % Philips	
R25	55 26 01 3333	33 k Ω 1/4W	10 % Allen-Bradley	
R26	55 26 01 3103	10 k Ω 1/4W	10 % Allen-Bradley	
R27	55 26 01 3333	33 k Ω 1/4W	10 % Allen-Bradley	
R28	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R29	55 26 01 3101	100 Ω 1/4W	10 % Allen-Bradley	
R30	55 26 01 3105	1 M Ω 1/4W	10 % Allen-Bradley	
R31	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R32	55 26 01 3475	4,7 M Ω 1/4W	10 % Allen-Bradley	
R33	55 26 01 3105	1 M Ω 1/4W	10 % Allen-Bradley	
R34	55 26 01 3475	4,7 M Ω 1/4W	10 % Allen-Bradley	
R35	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R36	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R37	55 27 18 3683	68 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R38	55 27 18 3822	8,2 k Ω 1/4W	TR5 200 ppm 2 % Electrosil	
R39	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R40	55 26 01 3224	220 k Ω 1/4W	10 % Allen-Bradley	
R41	56 31 00 1104	100 k Ω	Variable 20 % Ruwido	
R42	55 26 01 3333	33 k Ω 1/4W	10 % Allen-Bradley	
R43	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R44	55 26 01 3822	8,2 k Ω 1/4W	10 % Allen-Bradley	
R45	55 26 01 3153	15 k Ω 1/4W	10 % Allen-Bradley	
R46	55 26 01 3472	4,7 k Ω 1/4W	10 % Allen-Bradley	
R47	55 26 01 3152	1,5 k Ω 1/4W	10 % Allen-Bradley	
R48	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R49	55 26 01 3223	22 k Ω 1/4W	10 % Allen-Bradley	
R50	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R51	55 26 01 3224	220 k Ω 1/4W	10 % Allen-Bradley	
R52	55 26 01 3104	100 k Ω 1/4W	10 % Allen-Bradley	
R53	55 26 01 3473	47 k Ω 1/4W	10 % Allen-Bradley	
R54	55 26 01 3103	10 k Ω 1/4W	10 % Allen-Bradley	
R55	55 26 01 3222	2,2 k Ω 1/4W	10 % Allen-Bradley	
R56	55 26 01 3224	220 k Ω 1/4W	10 % Allen-Bradley	
R57	55 26 01 3333	33 k Ω 1/4W	10 % Allen-Bradley	
R58	55 26 01 3682	6,8 k Ω 1/4W	10 % Allen-Bradley	
CAPACITORS				
C1	52 12 04 2260	0,22 μ F	Electrolytic Dry Tantalum 35 V 20 % Sprague	
C2	52 12 04 1050	1 μ F	Electrolytic Dry Tantalum 35 V 20 % Sprague	
C3	52 12 03 2200	22 μ F	Electrolytic Dry Tantalum 15 V 20 % Sprague	
C4	52 12 03 2200	22 μ F	Electrolytic Dry Tantalum 15 V 20 % Sprague	
C5	52 12 04 2200	0,22 μ F	Electrolytic Dry Tantalum 35 V 20 % Sprague	
C6	53 22 60 7473	47 nF	Ceramic 250 V 20 % ERIE	
C7	52 12 01 6850	6,8 μ F	Electrolytic Dry Tantalum 6 V 20 % Sprague	
C8	52 12 04 1060	0,1 μ F	Electrolytic Dry Tantalum 35 V 20 % Sprague	
C9	52 12 04 1060	0,1 μ F	Electrolytic Dry Tantalum 35 V 20 % Sprague	
C10	52 12 03 2250	2,2 μ F	Electrolytic Dry Tantalum 15 V 20 % Sprague	
C11	52 12 02 3900	39 μ F	Electrolytic Dry Tantalum 10 V 20 % Sprague	
C12	52 12 01 4700	47 μ F	Electrolytic Dry Tantalum 6 V 20 % Sprague	
C13	52 12 01 6850	6,8 μ F	Electrolytic Dry Tantalum 6 V 20 % Sprague	

Reference	Kudelski part Number	Description					Manufacturer	Observation
C14	53 22 60 8222	2,2 nF		Ceramic	500 V	20 %	ERIE	
C15	53 22 60 9101	100 pF		Ceramic	750 V	20 %	ERIE	
C16	52 12 01 4700	47 μ F	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C17	52 12 01 4700	47 μ F	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C18	53 22 60 8222	2,2 nF		Ceramic	500 V	20 %	ERIE	

DIODES

D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D4	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D5	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D6	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D7	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D8	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected	SGS or Sylvania
D9	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D10	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D11	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania
D12	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania	SGS or Sylvania

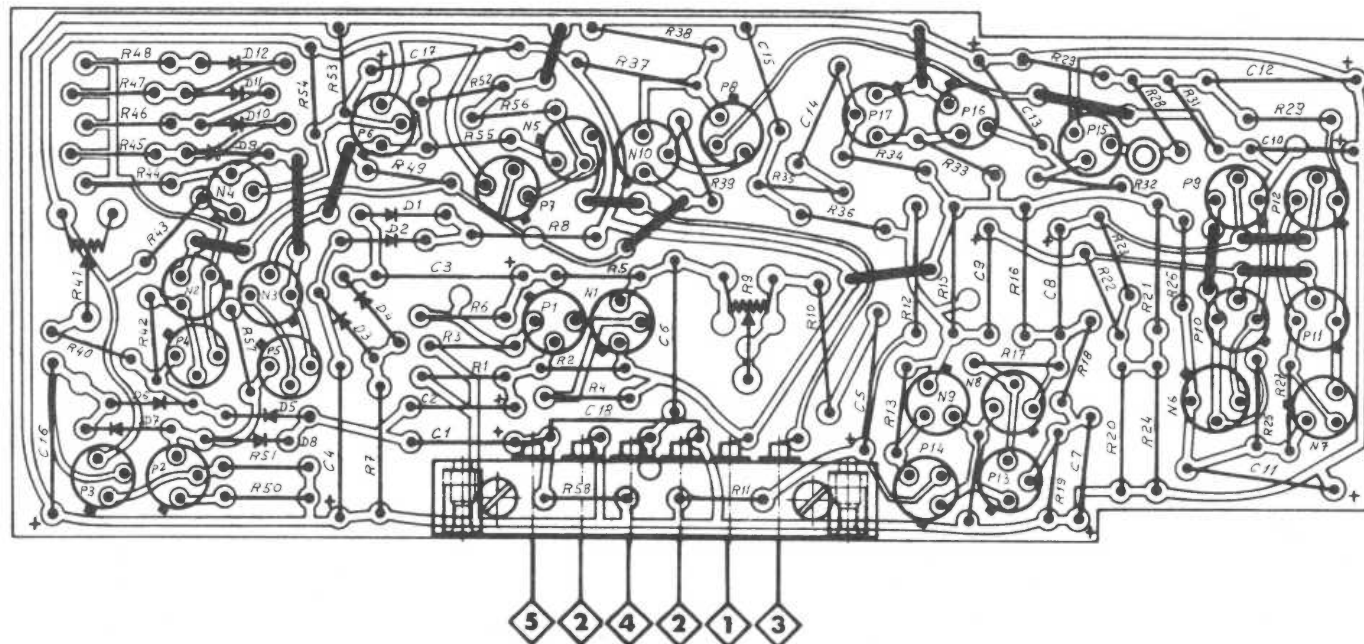
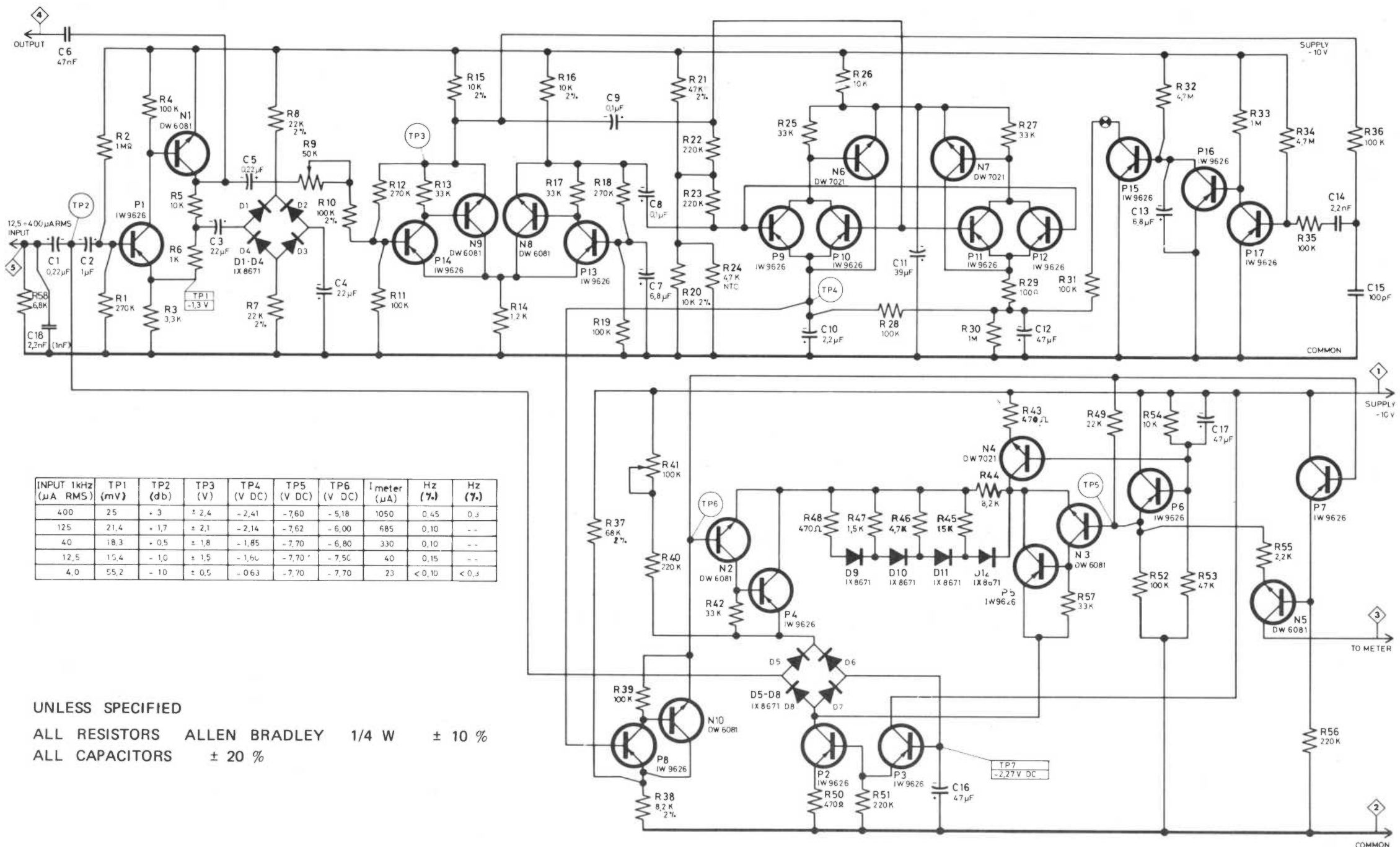
TRANSISTORS

N1	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N2	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N2	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N3	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N3	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N4	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N4	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N5	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N5	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N6	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3109)	SGS-Fairchild
N6	50 09 00 3010	Silicon	NPN	ES8070	Factory Selected	(Replaceable by 2N3109)	Motorola
N7	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3109)	SGS-Fairchild
N7	50 09 00 3010	Silicon	NPN	ES8070	Factory Selected	(Replaceable by 2N3109)	Motorola
N8	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N8	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N9	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N9	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N10	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N10	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P3	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P3	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P4	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P4	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P5	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P5	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P6	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P6	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P7	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P7	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P8	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P8	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P9	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P9	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P10	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P10	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P11	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P11	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P12	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P12	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P13	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P13	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P14	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P14	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P15	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P15	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P16	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P16	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P17	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P17	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola

CONNECTORS

01 04 21 0003	Pin Female
01 04 78 0002	Pin Male

Kudelski
Kudelski



E4.13

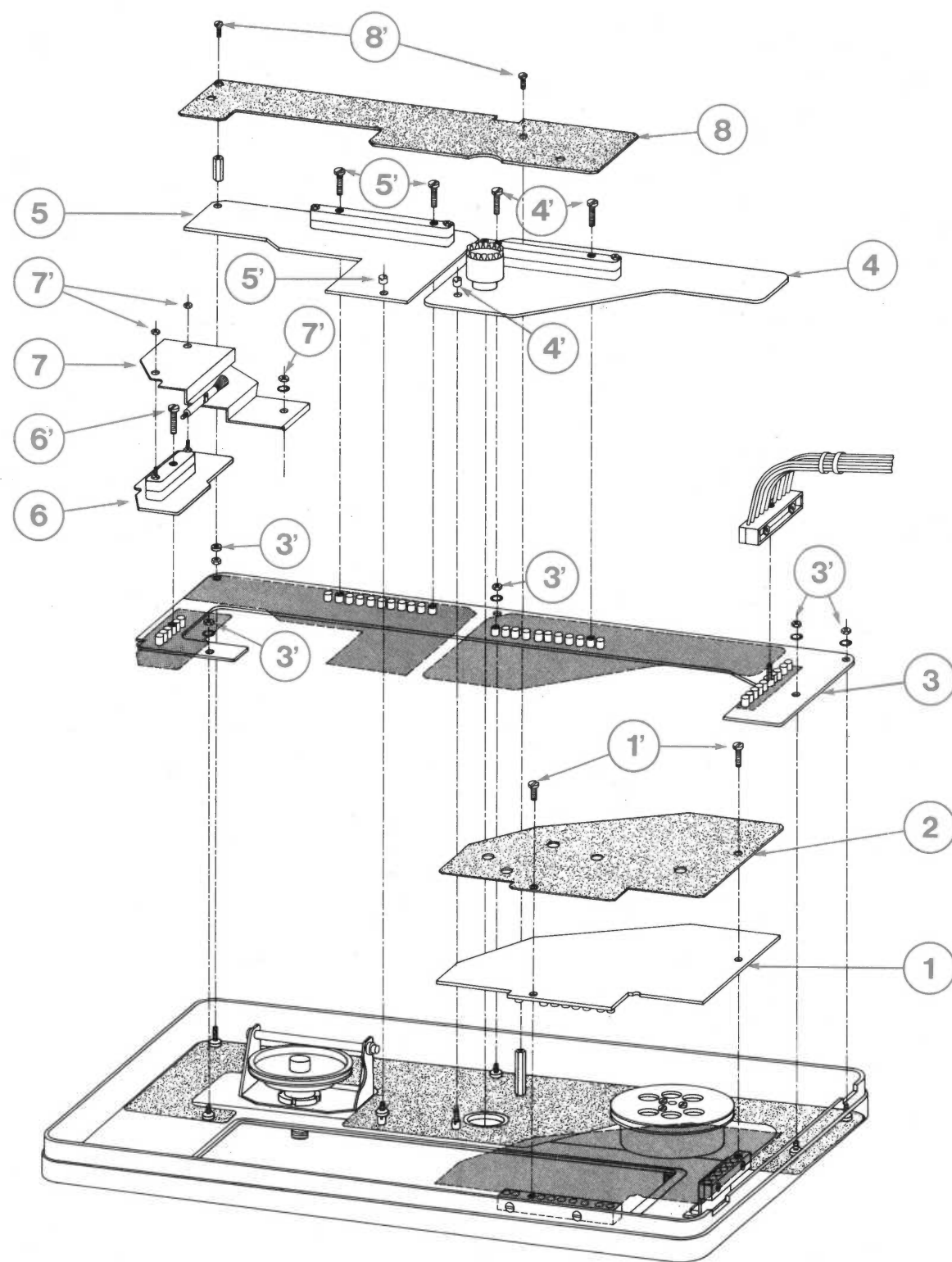
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Date: 7 16 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	
CIRCUIT DIAGRAM:	MAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone (212) 681-8888	
Copy:	KUDELSKI	09 04 730 0 01

- 5 — PLAYBACK AMPLIFIER
- AMPLIFICATEUR DE LECTURE
- WIEDERGABEVERSTAERKER

- 6 — PLAYBACK PREAMPLIFIER
- PREAMPLIFICATEUR DE LECTURE
- WIEDERGABEVORVERSTAERKER

- 7 — SHIELD
- BLINDAGE
- SCHIRM

- 8 — SHIELD
- BLINDAGE
- SCHIRM



- 1 — OSCILLATOR & PILOT AMPLIFIER
- OSCILLATEUR ET AMPLIFICATEUR PILOT
- OSCILLATOR UND PILOT VERSTAERKER

- 2 — SHIELD
- BLINDAGE
- SCHIRM

- 3 — INTERCONNECTION
- INTERCONNEXION
- VERBINDUNGSKREIS

- 4 — RECORDING AMPLIFIER
- AMPLIFICATEUR D'ENREGISTREMENT
- AUFNAHMEVERSTAERKER

PLAYBACK PREAMPLIFIER TYPE N & AMPLIFIER

PART NUMBER : 09 04 206 0 01

PLAYBACK PREAMPLIFIER TYPE N & AMPLIFIER

PART NUMBER : 09 04 206 0 01

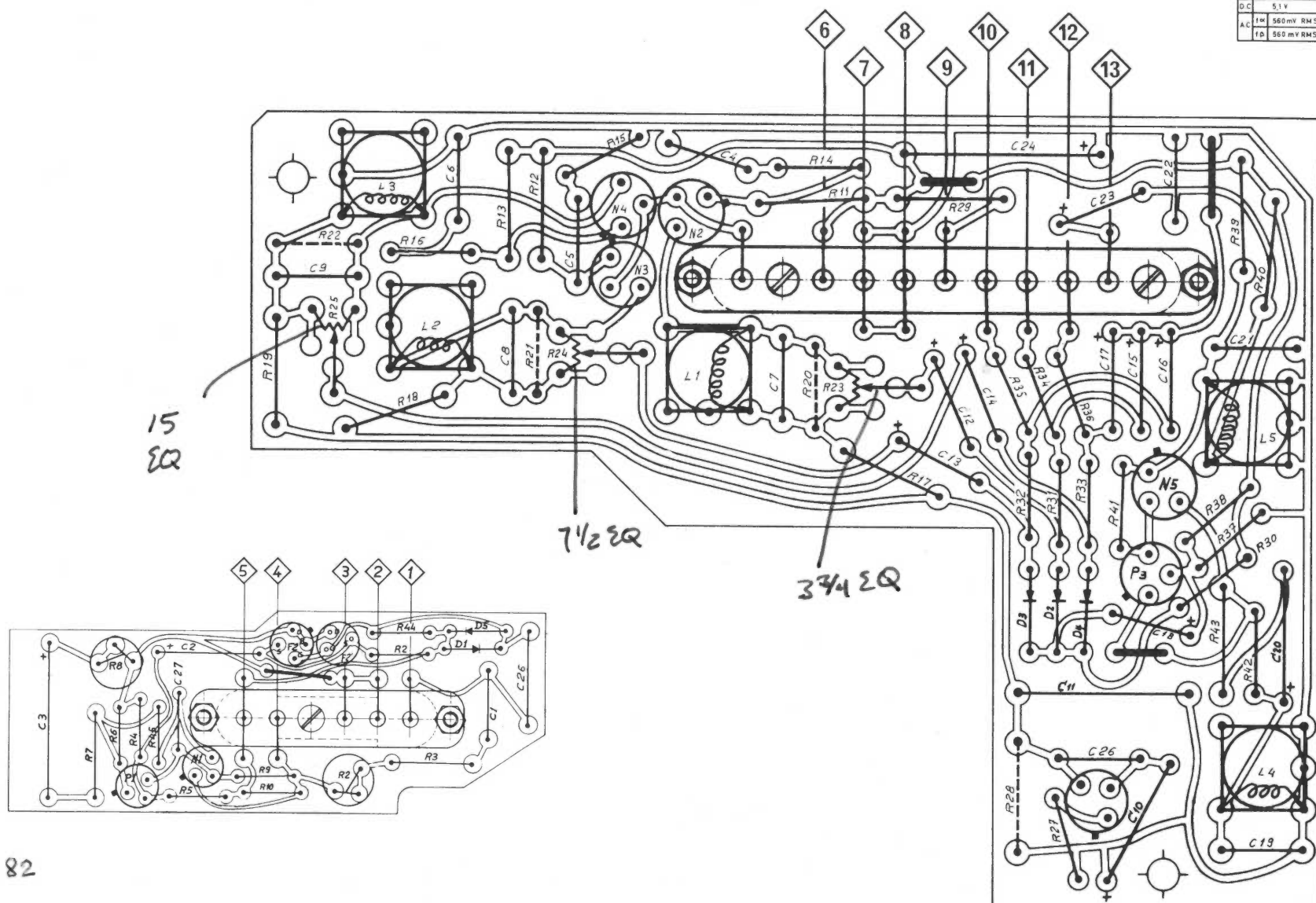
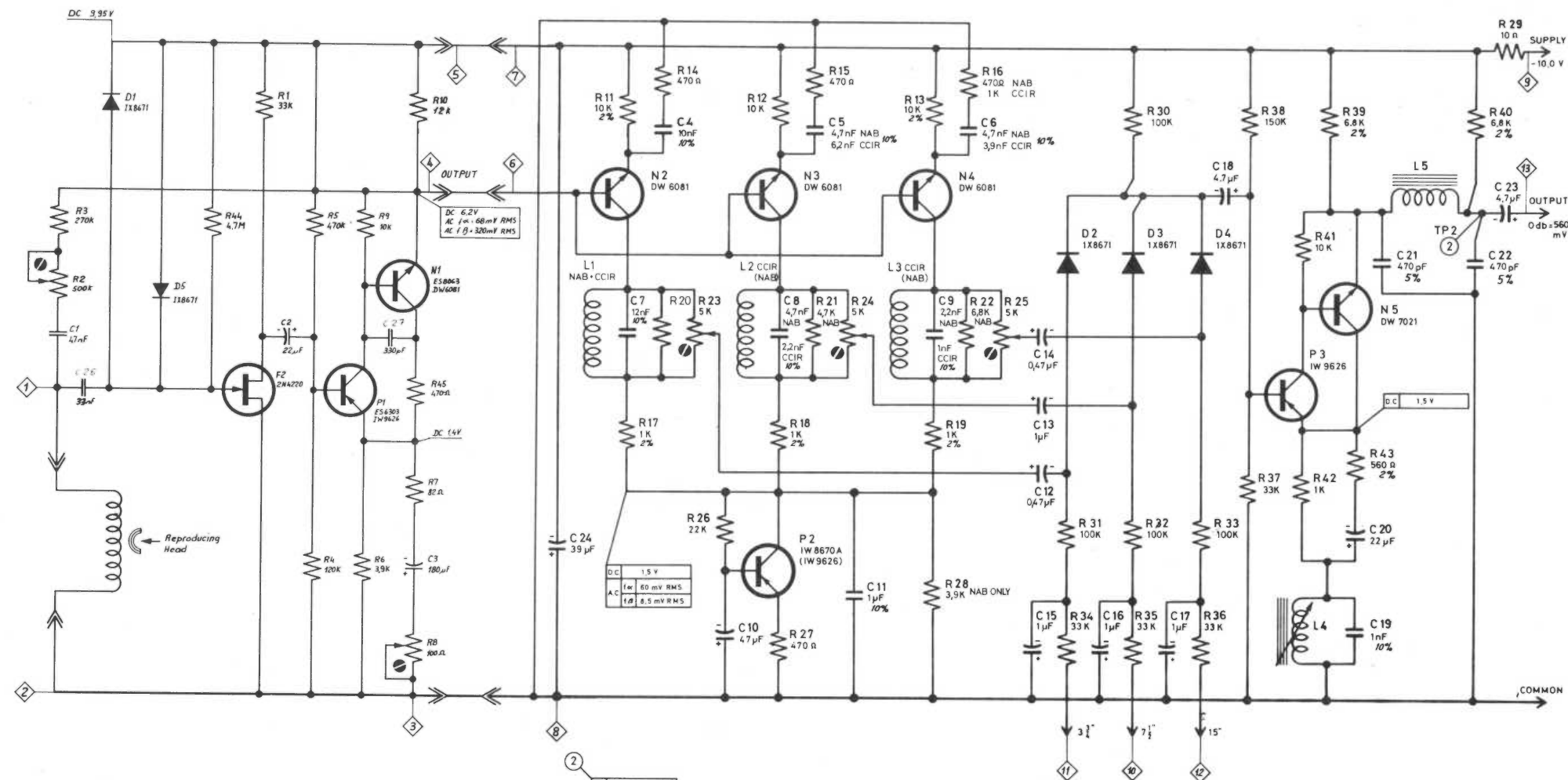
Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R2	56 26 00 0504	500 kΩ			Variable	20 %	Allen-Bradley	
R3	55 27 18 3274	270 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R4	55 26 01 3124	120 kΩ	1/4W			10 %	Allen-Bradley	
R5	55 26 01 3474	470 kΩ	1/4W			10 %	Allen-Bradley	
R6	55 26 01 3392	3,9 kΩ	1/4W			10 %	Allen-Bradley	
R7	55 27 18 3820	82 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R8	56 26 00 0101	100 Ω			Variable	20 %	Allen-Bradley	
R9	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R10	55 26 01 3123	12 kΩ	1/4W			10 %	Allen-Bradley	
R11	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R12	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R13	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R14	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R15	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R16	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	NAB only
R16	55 26 01 3102	1 kΩ	1/4W			10 %	Allen-Bradley	CCIR only
R17	55 27 18 3102	1 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R18	55 27 18 3102	1 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R19	55 27 18 3102	1 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R20								
R21	55 26 01 3472	4,7 kΩ	1/4W			10 %	Allen-Bradley	NAB only
R22	55 26 01 3682	6,8 kΩ	1/4W			10 %	Allen-Bradley	NAB only
R23	56 30 00 1502	5 kΩ			Variable	20 %	Dralowid	
R24	56 30 00 1502	5 kΩ			Variable	20 %	Dralowid	
R25	56 30 00 1502	5 kΩ			Variable	20 %	Dralowid	
R26	55 26 01 3223	22 kΩ	1/4W			10 %	Allen-Bradley	
R27	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R28	55 26 01 3392	3,9 kΩ	1/4W			10 %	Allen-Bradley	NAB only
R29	55 26 01 3100	10 Ω	1/4W			10 %	Allen-Bradley	
R30	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R31	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R32	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R33	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R34	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R35	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R36	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R37	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R38	55 26 01 3154	150 kΩ	1/4W			10 %	Allen-Bradley	
R39	55 27 18 3682	6,8 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R40	55 27 18 3682	6,8 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R41	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R42	55 26 01 3102	1 kΩ	1/4W			10 %	Allen-Bradley	
R43	55 27 18 3561	560 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R44	55 26 01 3475	4,7 MΩ	1/4W			10 %	Allen-Bradley	
R45	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
CAPACITORS								
C1	53 21 42 7473	47 nF		Polycarbonate	100 V	10 %	Fribourg	
C2	52 12 03 2200	22 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C3	52 12 01 1810	180 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C4	53 21 42 7103	10 nF		Polycarbonate	100 V	10 %	Fribourg	
C5	53 21 42 7622	6,2 nF		Polycarbonate	100 V	10 %	Fribourg	CCIR only
C5	53 21 42 7472	4,7 nF		Polycarbonate	100 V	10 %	Fribourg	NAB only
C6	53 21 42 7472	4,7 nF		Polycarbonate	100 V	10 %	Fribourg	NAB only
C6	53 21 42 7332	3,3 nF		Polycarbonate	100 V	10 %	Fribourg	CCIR only
C7	53 21 42 7123	12 nF		Polycarbonate	100 V	10 %	Fribourg	
C8	53 21 42 7472	4,7 nF		Polycarbonate	100 V	10 %	Fribourg	NAB only
C8	53 21 42 7222	2,2 nF		Polycarbonate	100 V	10 %	Fribourg	CCIR only
C9	53 21 42 7222	2,2 nF		Polycarbonate	100 V	10 %	Fribourg	
C10	52 12 01 4700	47 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C11	53 21 47 4105	1 μF		Polycarbonate	25 V	10 %	Fribourg	
C12	52 12 04 4760	0,47 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C13	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C14	52 12 04 4760	0,47 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C15	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C16	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C17	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C18	52 12 02 4750	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C19	53 21 42 7102	1 nF		Polycarbonate	100 V	10 %	Fribourg	
C20	52 12 03 2200	22 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C21	53 21 42 7471	470 pF		Polycarbonate	100 V	10 %	Fribourg	
C22	53 21 42 7471	470 pF		Polycarbonate	100 V	10 %	Fribourg	

Reference	Kudelski part Number	Description						Manufacturer	Observation
C23	52 12 02 4750	4,7 μ F	Electrolytic	Dry Tantalum	10 V	20 %		Sprague	
C24	52 12 01 3900	39 μ F	Electrolytic	Dry Tantalum	6 V	20 %		Sprague	
C26	53 21 45 5333	33 nF		Polycarbonate	63 V	20 %		Fribourg	
C27	53 32 04 8331	330 pF		Ceramic	500 V	20 %		ERIE	
DIODES									
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania			SGS-Sylvania	
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania			SGS-Sylvania	
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania			SGS-Sylvania	
D4	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania			SGS-Sylvania	
D5	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania			SGS-Sylvania	
TRANSISTORS									
N1	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)		SGS-Fairchild	
N1	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)		Motorola	
N2	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)		SGS-Fairchild	
N2	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)		Motorola	
N3	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)		SGS-Fairchild	
N3	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)		Motorola	
N4	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)		SGS-Fairchild	
N4	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)		Motorola	
N5	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)		SGS-Fairchild	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)		SGS-Fairchild	
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)		Motorola	
P2	50 01 00 2060	Silicon	PNP	IW8670A	Factory Selected	(Replaceable by 2N3962)		SGS-Fairchild	
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)		Motorola	
P3	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)		SGS-Fairchild	
P3	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)		Motorola	
F2	50 09 00 4000	Silicon	N	Channel	2N4220A			Motorola	
INDUCTORS									
L1	99 99 13 3010	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$			Philips	
L2	99 99 13 3200	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$			Philips	NAB only
L2	99 99 13 3020	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$			Philips	CCIR only
L3	99 99 13 3210	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$			Philips	NAB only
L3	99 99 13 3030	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$			Philips	CCIR only
L4	99 99 13 3040	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 68$			Philips	
L5	99 99 13 3050	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$			Philips	
CONNECTORS									
	01 04 78 0002	Pin Female						Kudelski	

MODIFICATIONS FOR THE 35 KHZ CCIR VERSION

$C_6 = 3,3 \text{ nF}$, $R_{16} = 470 \Omega$
 $L_4 = 0,765 \text{ mH}$, $L_5 = 33 \text{ mH}$, $C_{19} = 2,2 \text{ nF}$
 $C_{21} = 330 \text{ pF}$, $C_{22} = 330 \text{ pF}$

$L_1 (\text{NAB} + \text{CCIR}) = 21,1 \text{ mH} \pm 5\%$
 $L_2 (\text{CCIR}) = 28,0 \text{ mH} \pm 3\%$
 $L_2 (\text{NAB}) = 16,6 \text{ mH} \pm 3\%$
 $L_3 (\text{CCIR}) = 14,0 \text{ mH} \pm 3\%$
 $L_3 (\text{NAB}) = 8,9 \text{ mH} \pm 3\%$
 $L_4 = 1,67 \text{ mH} \pm 3\%$
 $L_5 = 48,0 \text{ mH} \pm 3\%$



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$
 ALL CAPACITORS $\pm 20\%$

MODIFICATIONS FOR SINGLE SPEED MACHINE 7,5"/S

Suppressed

R_{13} , R_{14} , R_{15} , R_{19} , R_{22} , R_{23} , R_{25} , R_{31}

R_{33} , R_{34} , R_{36} , C_4 , C_6 , C_7 , C_9 , C_{14}

C_{12} , C_{15} , C_{17} , D_2 , D_4 , L_1 , L_3 , N_4

R_{17} = Bridged , $R_{11} = 4,7 \text{ k}\Omega$, $R_{20} = 5,6 \text{ k}\Omega$

Modification :	Valid from ser. N° :	KUDELSKI - Dept. NAGRA - CHESEAUX
	This drawing is confidential and may not be divulged in whole or in part to a third party.	CH 1033 Switzerland - Telex 24 392
Date : 6 16 70		NAGRA MAGNETIC RECORDERS INC.
		19 West 44th Street - New York N.Y. 10036
		Phone : (212) 661-8999
CIRCUIT DIAGRAM :	PLAYBACK PREAMPLIFIER	Drawn : J. M.
TYPE N & AMPLIFIER NAGRA IV - L & D		Controlled : J. M.
Copy :	KUDELSKI	Checked : J. M.
		Printed : J. M.
		09 04 206 0 01

PLAYBACK PREAMPLIFIER TYPE P & AMPLIFIER

PART NUMBER : 09 04 200 0 01

PLAYBACK PREAMPLIFIER TYPE P & AMPLIFIER

PART NUMBER : 09 04 200 0 01

Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R2	56 26 00 0504	500 kΩ		Variable	Variable	20 %	Allen-Bradley	
R3	55 27 18 3224	220 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R4	55 26 01 3124	120 kΩ	1/4W			10 %	Allen-Bradley	
R5	55 26 01 3474	470 kΩ	1/4W			10 %	Allen-Bradley	
R6	55 26 01 3392	3,9 kΩ	1/4W			10 %	Allen-Bradley	
R7	55 27 18 3820	82 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R8	56 26 00 0101	100 Ω			Variable	20 %	Allen-Bradley	
R9	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R10	55 26 01 3103	10 kΩ				10 %	Allen-Bradley	
R11	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R12	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R13	55 27 18 3103	10 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R14	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R15	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R16	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	NAB only
R16	55 26 01 3102	1 kΩ	1/4W			10 %	Allen-Bradley	CCIR only
R17	55 27 18 3102	1 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R18	55 27 18 3102	1 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R19	55 27 18 3102	1 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R20								
R21	55 26 01 3472	4,7 kΩ	1/4W			10 %	Allen-Bradley	NAB only
R22	55 26 01 3682	6,8 kΩ	1/4W			10 %	Allen-Bradley	NAB only
R23	56 30 00 1502	5 kΩ			Variable	20 %	Dralowid	
R24	56 30 00 1502	5 kΩ			Variable	20 %	Dralowid	
R25	56 30 00 1502	5 kΩ			Variable	20 %	Dralowid	
R26	55 26 01 3223	22 kΩ	1/4W			10 %	Allen-Bradley	
R27	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R28	55 26 01 3392	3,9 kΩ	1/4W			10 %	Allen-Bradley	NAB only
R29	55 26 01 3100	10 Ω	1/4W			10 %	Allen-Bradley	
R30	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R31	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R32	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R33	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R34	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R35	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R36	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R37	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R38	55 26 01 3154	150 kΩ	1/4W			10 %	Allen-Bradley	
R39	55 27 18 3682	6,8 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R40	55 27 18 3682	6,8 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R41	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R42	55 26 01 3102	1 kΩ	1/4W			10 %	Allen-Bradley	
R43	55 27 18 3561	560 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
CAPACITORS								
C1	53 21 42 7473	47 nF		Polycarbonate	100 V	10 %	Fribourg	
C2	52 12 03 2200	22 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C3	52 12 01 1810	180 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C4	53 21 42 7103	10 nF		Polycarbonate	100 V	10 %	Fribourg	
C5	53 21 42 7472	4,7 nF		Polycarbonate	100 V	10 %	Fribourg	NAB only
C5	53 21 42 7622	6,2 nF		Polycarbonate	100 V	10 %	Fribourg	CCIR only
C6	53 21 42 7472	4,7 nF		Polycarbonate	100 V	10 %	Fribourg	NAB only
C6	53 21 42 7332	3,3 nF		Polycarbonate	100 V	10 %	Fribourg	CCIR only
C7	53 21 42 7123	12 nF		Polycarbonate	100 V	10 %	Fribourg	
C8	53 21 42 7472	4,7 nF		Polycarbonate	100 V	10 %	Fribourg	NAB only
C8	53 21 42 7222	2,2 nF		Polycarbonate	100 V	10 %	Fribourg	CCIR only
C9	53 21 42 7222	2,2 nF		Polycarbonate	100 V	10 %	Fribourg	
C10	52 12 01 4700	47 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C11	53 21 47 4105	1 μF		Polycarbonate	25 V	10 %	Fribourg	
C12	52 12 04 4760	0,47 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C13	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C14	52 12 04 4760	0,47 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C15	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C16	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C17	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C18	52 12 02 4750	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C19	53 21 42 7102	1 nF		Polycarbonate	100 V	10 %	Fribourg	
C20	52 12 03 2200	22 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C21	53 21 42 7471	470 pF		Polycarbonate	100 V	10 %	Fribourg	
C22	53 21 42 7471	470 pF		Polycarbonate	100 V	10 %	Fribourg	
C23	52 12 02 4750	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C24	52 12 01 3900	39 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C25	53 32 04 8569	5,6 pF		Ceramic	500 V	20 %	ERIE	

Reference	Kudelski part Number	Description					Manufacturer	Observation
DIODES								
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS-Sylvania	
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS-Sylvania	
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS-Sylvania	
D4	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS-Sylvania	
TRANSISTORS								
N1	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N1	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N2	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N2	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N3	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N3	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N4	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N4	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N5	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P2	50 01 00 2060	Silicon	PNP	IW8670A	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P3	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P3	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
F1	50 01 00 4000	Silicon	P Channel	BFX82			SGS-Fairchild	
INDUCTORS								
L1	99 99 13 3010	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$		Philips	
L2	99 99 13 3200	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$		Philips	NAB only
L2	99 99 13 3020	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$		Philips	CCIR only
L3	99 99 13 3210	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$		Philips	NAB only
L3	99 99 13 3030	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$		Philips	CCIR only
L4	99 99 13 3040	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 68$		Philips	
L5	99 99 13 3050	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 150$		Philips	
CONNECTORS								
	01 04 78 0002	Pin Male					Kudelski	

MODIFICATIONS FOR THE 35 KHZ CCIR VERSION

C_{25} = Suppressed , C_6 = 3,3 nF , R_{16} = 470 Ω

L_4 = 0,765 mH , L_5 = 33 mH , C_{19} = 2,2 nF

C_{21} = 330 pF , C_{22} = 330 pF

L_1 (NAB + CCIR) = 21,1 mH $\pm 5\%$

L_2 (CCIR) = 28,0 mH $\pm 3\%$

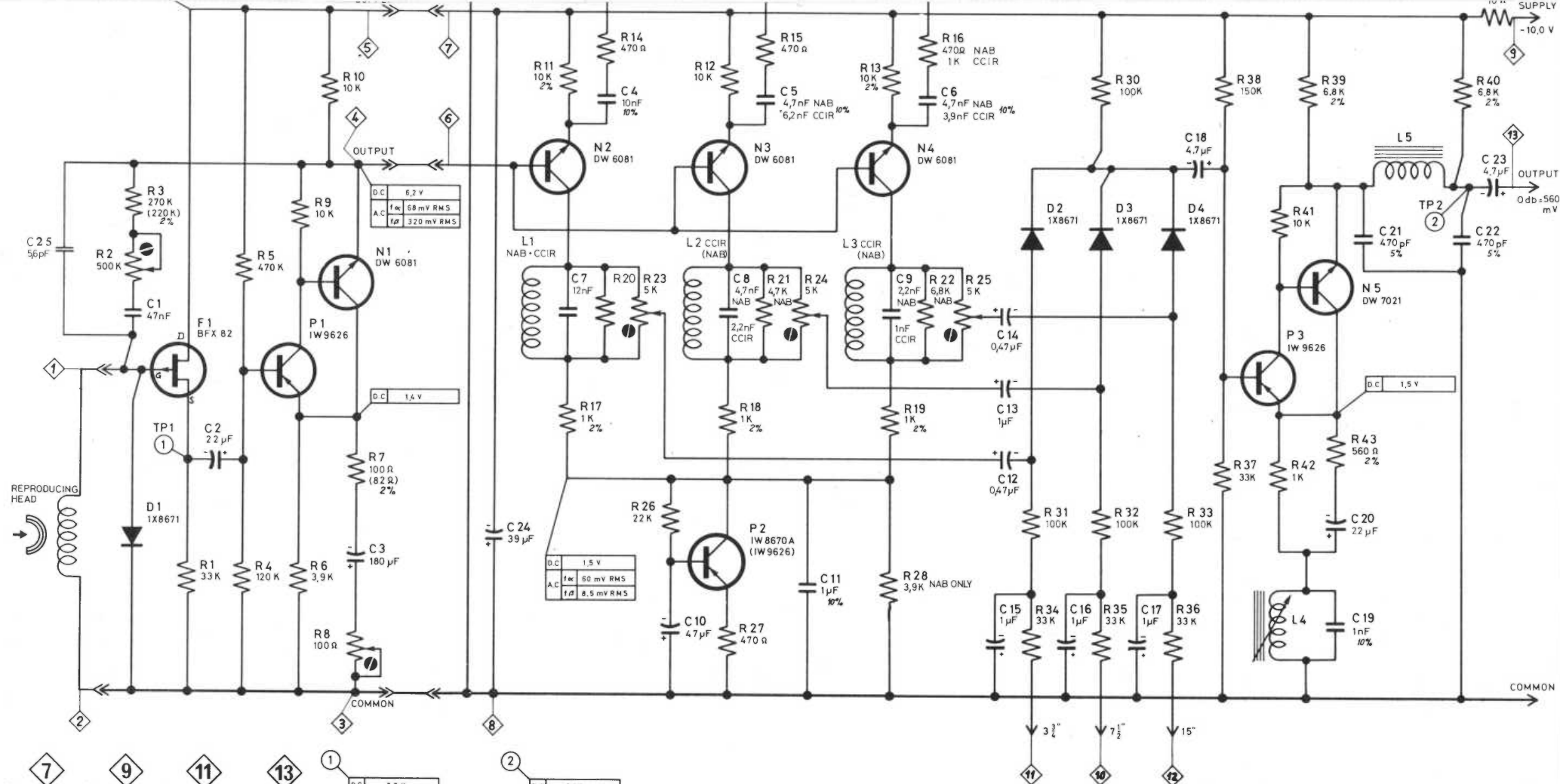
L_2 (NAB) = 16,6 mH $\pm 3\%$

L_3 (CCIR) = 14,0 mH $\pm 3\%$

L_3 (NAB) = 8,9 mH $\pm 3\%$

L_4 = 1,67 mH $\pm 3\%$

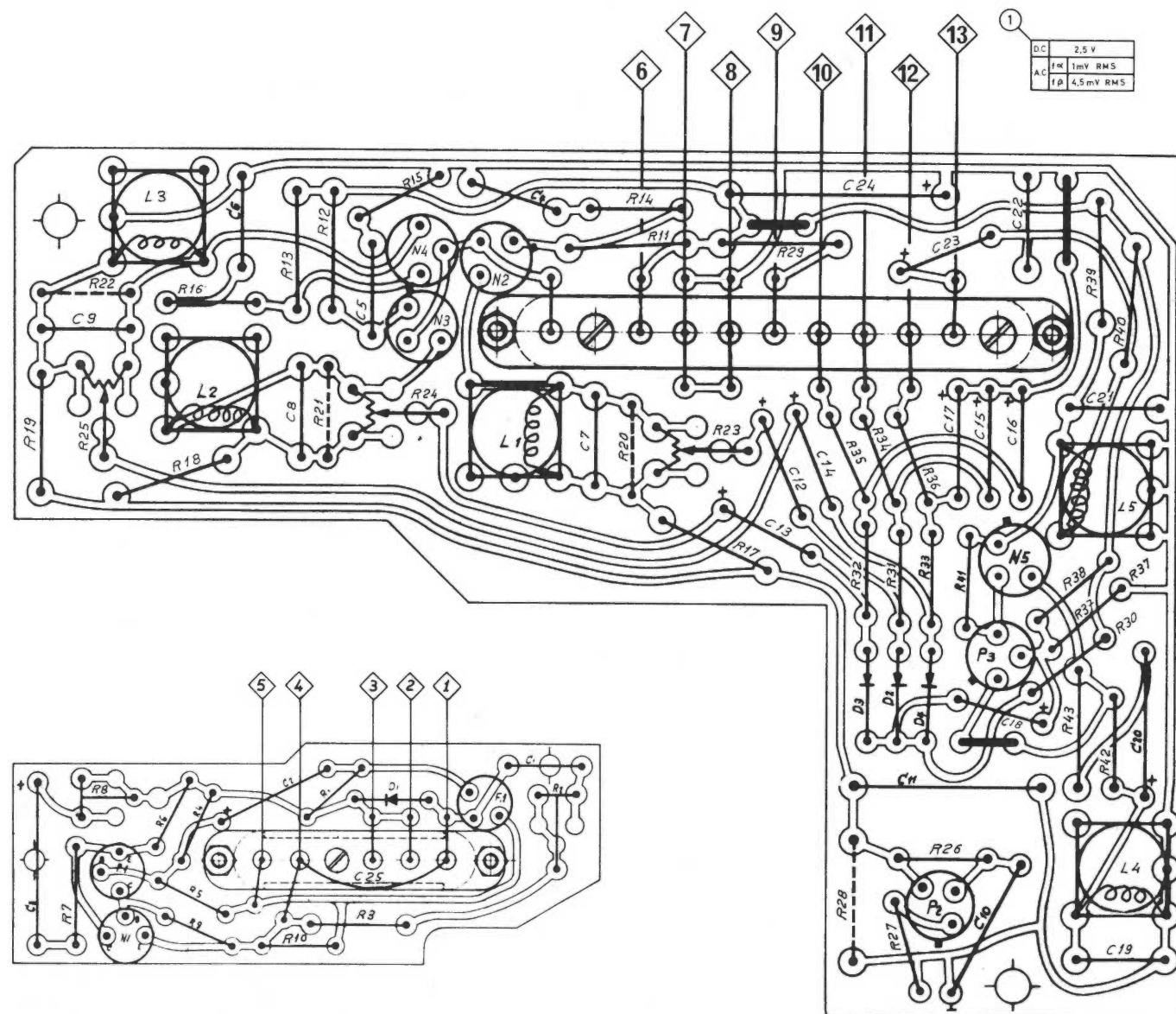
L_5 = 48,0 mH $\pm 3\%$



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$

ALL CAPACITORS $\pm 20\%$



MODIFICATIONS FOR SINGLE SPEED MACHINE 7,5 "/S

Suppressed

R_{13} , R_{14} , R_{15} , R_{19} , R_{22} , R_{23} , R_{25} , R_{31}

R_{33} , R_{34} , R_{36} , C_4 , C_6 , C_7 , C_9 , C_{14}

C_{12} , C_{15} , C_{17} , D_2 , D_4 , L_1 , L_3 , N_4

R_{17} = Bridged , R_{11} = 4,7 k Ω , R_{20} = 5,6 k Ω

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 6 16 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 661-8066
CIRCUIT DIAGRAM:	PLAYBACK PREAMPLIFIER	Drawn: J. M. Controlled: J. M. Checked: J. M. Printed: J. M.
TYPE P & AMPLIFIER NAGRA IV - L & D	Copy:	KUDELSKI 09 04 200 0 01

E5.2

OSCILLATOR & PILOT AMPLIFIER

PART NUMBER : 09 04 210 0 01

OSCILLATOR & PILOT AMPLIFIER

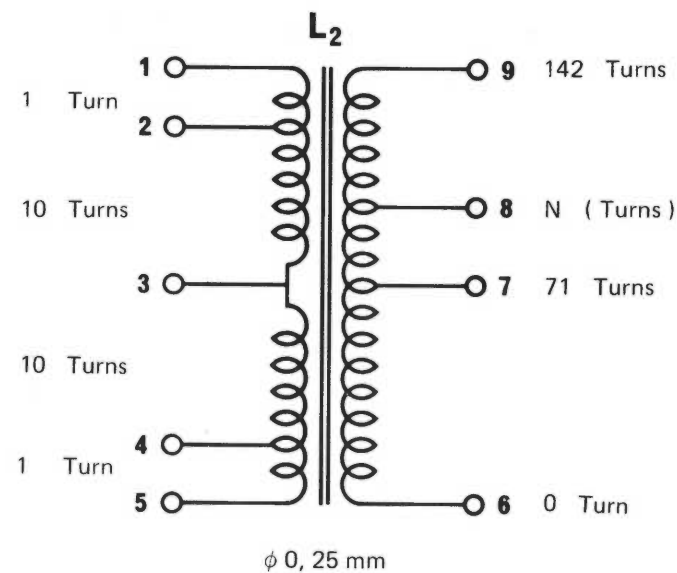
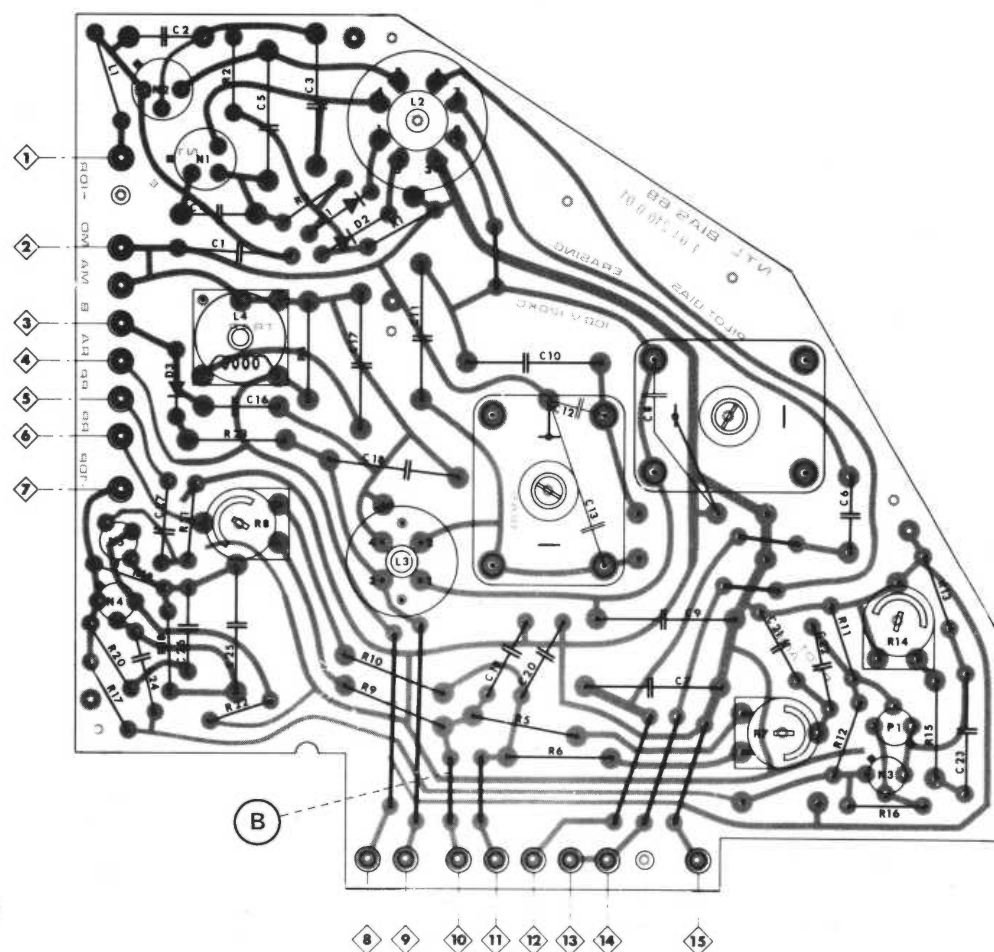
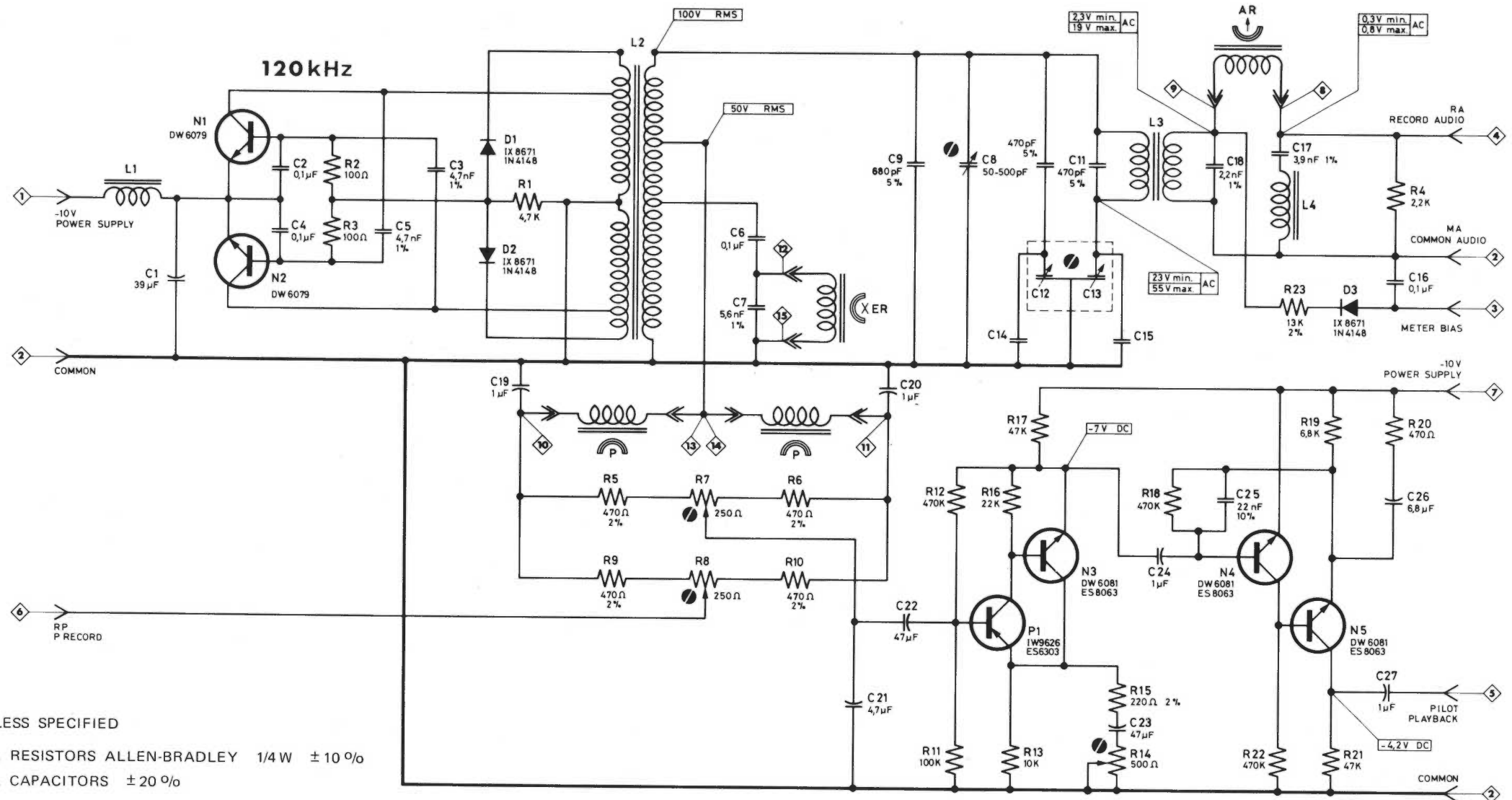
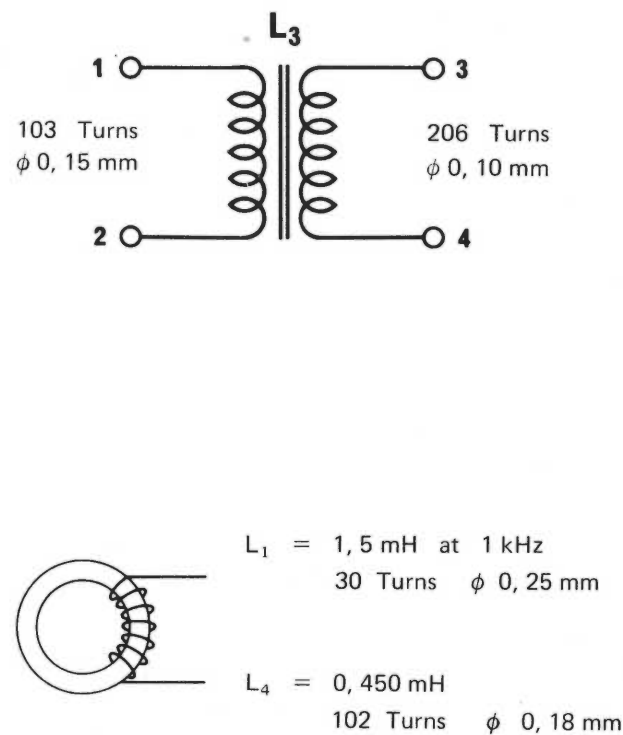
PART NUMBER : 09 04 210 0 01

Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	55 26 01 3472	4,7 kΩ	1/4W			10 %	Allen-Bradley	
R2	55 26 01 3101	100 Ω	1/4W			10 %	Allen-Bradley	
R3	55 26 01 3101	100 Ω	1/4W			10 %	Allen-Bradley	
R4	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R5	55 27 18 3471	470 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R6	55 27 18 3471	470 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R7	56 30 00 1251	250 Ω			Variable	20 %	Ruwido or Dralowid	
R8	56 30 00 1251	250 Ω			Variable	20 %	Ruwido or Dralowid	
R9	55 27 18 3471	470 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R10	55 27 18 3471	470 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R11	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R12	55 26 01 3474	470 kΩ	1/4W			10 %	Allen-Bradley	
R13	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R14	56 30 00 1501	500 Ω			Variable	20 %	Ruwido or Dralowid	
R15	55 27 18 3221	220 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R16	55 26 01 3223	22 kΩ	1/4W			10 %	Allen-Bradley	
R17	55 26 01 3473	47 kΩ	1/4W			10 %	Allen-Bradley	
R18	55 26 01 3474	470 kΩ	1/4W			10 %	Allen-Bradley	
R19	55 26 01 3682	6,8 kΩ	1/4W			10 %	Allen-Bradley	
R20	55 26 01 3471	470 Ω	1/4W			10 %	Allen-Bradley	
R21	55 26 01 3473	47 kΩ	1/4W			10 %	Allen-Bradley	
R22	55 26 01 3474	470 kΩ	1/4W			10 %	Allen-Bradley	
R23	55 27 18 3183	18 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
CAPACITORS								
C1	52 12 02 3900	39 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C2	53 21 42 7104	0,1 μF		Polycarbonate	100 V	20 %	Fribourg	
C3	53 00 50 5472	4,7 nF		Polystyrene	63 V	1 %	Philips	
C4	53 21 42 7104	0,1 μF		Polycarbonate	100 V	20 %	Fribourg	
C5	53 00 50 5472	4,7 nF		Polystyrene	63 V	1 %	Philips	
C6	53 21 42 7104	0,1 μF		Polycarbonate	100 V	20 %	Fribourg	
C7	53 00 49 7562	5,6 nF		Polystyrene	125 V	1 %	Philips	
C8	91 04 21 3000	50-500 pF	Variable				Kudelski	
C9	53 00 50 8681	680 pF		Polystyrene	500 V	1 %	Philips	
C10	53 21 53 8471	470 pF		Polystyrene	500 V	5 %	Fribourg	
C11	53 21 53 8471	470 pF		Polystyrene	500 V	5 %	Fribourg	
C12-C13 C14-C15	91 04 21 2000	50-500 pF	Differential				Kudelski	
C16	53 21 42 7104	0,1 μF		Polycarbonate	100 V	20 %	Fribourg	
C17	53 00 50 7202	3,9 nF		Polystyrene	125 V	1 %	Philips	
C18	53 00 50 7222	2,2 nF		Polystyrene	125 V	1 %	Philips	
C19	52 12 04 1050	1,1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C20	52 12 04 1050	1,1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C21	52 12 02 4705	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C22	52 12 01 6850	6,8 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C23	52 12 01 4700	47 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C24	52 12 04 1050	1,1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C25	53 00 37 7223	22 nF		Polyester	250 V	10 %	Philips	
C26	52 12 01 6850	6,8 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C27	52 12 04 1050	1,1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
DIODES								
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
TRANSISTORS								
N1	50 01 00 3090	Silicon	NPN	DW6079	Factory Selected	(Replaceable by 2N3107)	SGS-Fairchild	
N2	50 01 00 3090	Silicon	NPN	DW6079	Factory Selected	(Replaceable by 2N3107)	SGS-Fairchild	
N3	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N3	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N4	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N4	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N5	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N5	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
INDUCTORS								
L1	99 99 13 3070	Toroid	2P653 30	3E2			Philips	
L2-A	99 99 11 3010	Ferroxcube	P18/11	3H1 or 3B7	μ' = 33		Philips	
L2-B	99 99 11 3011	Ferroxcube	P18/11	3H1 or 3B7	μ' = 33		Philips	
L2-C	99 99 11 3012	Ferroxcube	P18/11	3H1 or 3B7	μ' = 33		Philips	

Reference	Kudelski part Number	Description				Manufacturer	Observation
L2-D	99 99 11 3013	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 33$	Philips	
L2-E	99 99 11 3014	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 33$	Philips	
L2-F	99 99 11 3015	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 33$	Philips	
L2-G	99 99 11 3016	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 33$	Philips	
L2-H	99 99 11 3017	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 33$	Philips	
L2-I	99 99 11 3018	Ferroxcube	P18/11	3H1 or 3B7	$\mu' = 33$	Philips	
L3	99 99 11 3020	Ferroxcube	P14/8	3H1 or 3B7	$\mu' = 47$	Philips	
L4	99 99 13 3060	Ferroxcube	P11/7	3H1 or 3B7	$\mu' = 33$	Philips	

CONNECTORS

01 04 770 002	Pin Female	Kudelski
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N (Turns)	Color Code	Type
142	Brown	A
127	Red	B
113	Orange	C
100	Yellow	D
90	Green	E
80	Blue	F
71	Violet	G
69	Grey	H
57	White	I

NON SYNCHRONOUS MACHINES

Suppressed

R_5 to R_{22} — C_{19} to C_{27}

P_1 , N_3 , N_4 , N_5

MODIFICATIONS FOR THE 35 kHz CCIR VERSION

$L_4 = 0,925 \text{ mH}$ — 96,5 Turns — ϕ 0, 18 mm

$C_{17} = 2 \text{ nF}$ $\pm 1\%$

E5.3

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 6.13.70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 681-8066
Circuit Diagram:	OSCILLATOR & PILOT AMPLIFIER	Drawn: <i>[Signature]</i> Controlled: <i>[Signature]</i> Checked: <i>[Signature]</i> Printed: <i>[Signature]</i>
Copy:	KUDELSKI	09 04 210 0 01

RECORDING AMPLIFIER

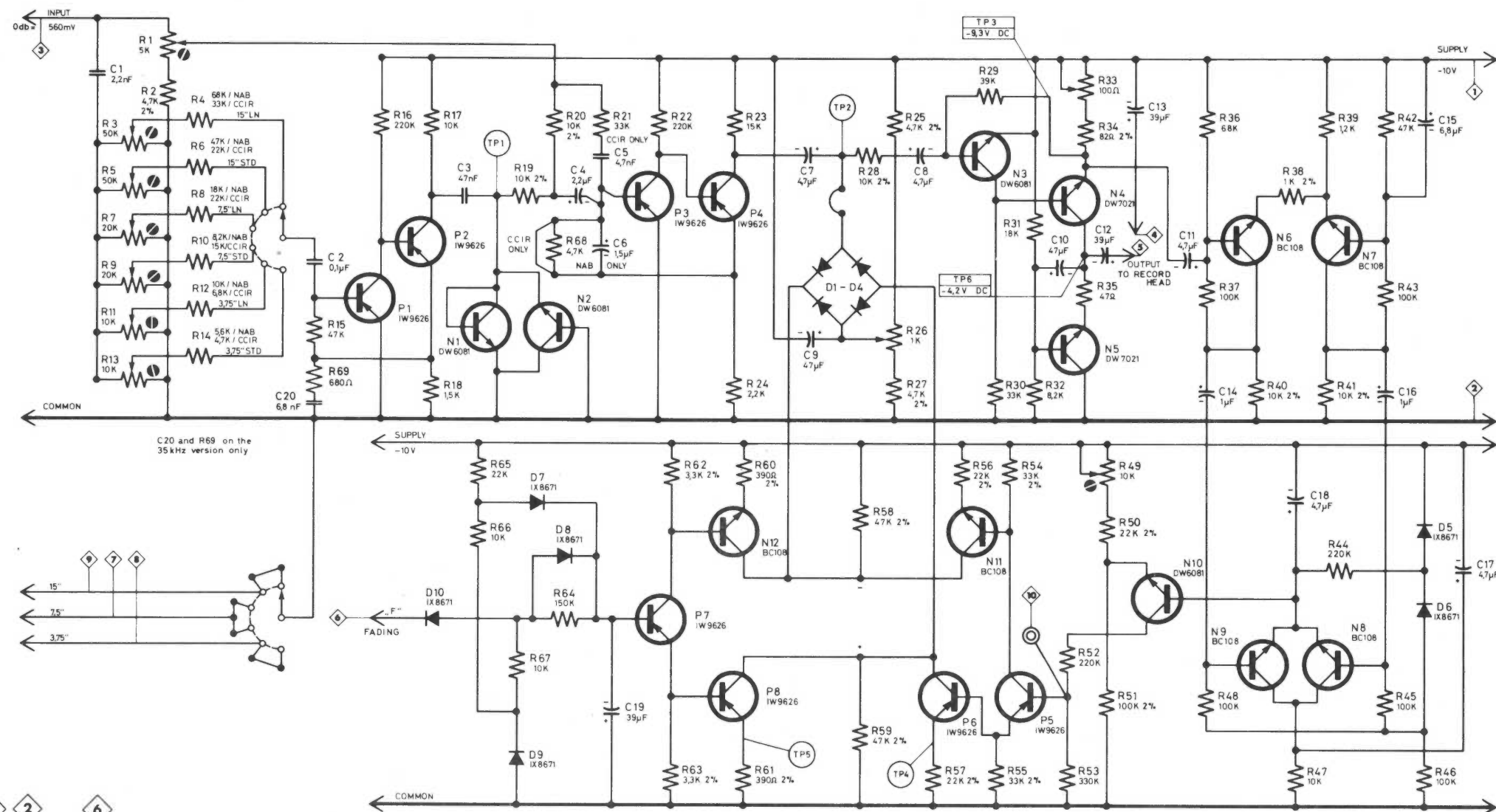
PART NUMBER : 09 04 215 0 01

RECORDING AMPLIFIER

PART NUMBER : 09 04 215 0 01

Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	56 30 00 1502	5 k Ω			Variable	20 %	Dralowid	
R2	55 27 18 3472	4,7 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R3	56 30 00 1503	50 k Ω			Variable	20 %	Dralowid	
R4	55 26 01 3683	68 k Ω	1/4W			10 %	Allen-Bradley	NAB only
R4	55 26 01 3333	33 k Ω	1/4W			10 %	Allen-Bradley	CCIR only
R5	56 30 00 1503	50 k Ω			Variable	20 %	Dralowid	
R6	55 26 01 3473	47 k Ω	1/4W			10 %	Allen-Bradley	NAB only
R6	55 26 01 3223	22 k Ω	1/4W			10 %	Allen-Bradley	CCIR only
R7	56 30 00 1203	20 k Ω			Variable	20 %	Dralowid	
R8	55 26 01 3183	18 k Ω	1/4W			10 %	Allen-Bradley	NAB only
R8	55 26 01 3223	22 k Ω	1/4W			10 %	Allen-Bradley	CCIR only
R9	56 30 00 1203	20 k Ω			Variable	20 %	Dralowid	
R10	55 26 01 3822	8,2 k Ω	1/4W			10 %	Allen-Bradley	NAB only
R10	55 26 01 3153	15 k Ω	1/4W			10 %	Allen-Bradley	CCIR only
R11	56 30 00 1103	10 k Ω			Variable	20 %	Dralowid	
R12	55 26 01 3103	10 k Ω	1/4W			10 %	Allen-Bradley	NAB only
R12	55 26 01 3682	6,8 k Ω	1/4W			10 %	Allen-Bradley	CCIR only
R13	56 30 00 1103	10 k Ω			Variable	20 %	Dralowid	
R14	55 26 01 3562	5,6 k Ω	1/4W			10 %	Allen-Bradley	NAB only
R14	55 26 01 3472	4,7 k Ω	1/4W			10 %	Allen-Bradley	CCIR only
R15	55 26 01 3473	47 k Ω	1/4W			10 %	Allen-Bradley	
R16	55 26 01 3224	220 k Ω	1/4W			10 %	Allen-Bradley	
R17	55 26 01 3103	10 k Ω	1/4W			10 %	Allen-Bradley	
R18	55 26 01 3152	1,5 k Ω	1/4W			10 %	Allen-Bradley	
R19	55 27 18 3103	10 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R20	55 27 18 3103	10 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R21	55 26 01 3333	33 k Ω	1/4W			10 %	Allen-Bradley	CCIR only
R22	55 26 01 3224	220 k Ω	1/4W			10 %	Allen-Bradley	
R23	55 26 01 3153	15 k Ω	1/4W			10 %	Allen-Bradley	
R24	55 26 01 3222	2,2 k Ω	1/4W			10 %	Allen-Bradley	
R25	55 27 18 3472	4,7 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R26	56 30 00 1102	1 k Ω			Variable	20 %	Dralowid	
R27	55 27 18 3472	4,7 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R28	55 27 18 3103	10 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R29	55 27 18 3393	39 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R30	55 26 01 3333	33 k Ω	1/4W			10 %	Allen-Bradley	
R31	55 26 01 3183	18 k Ω	1/4W			10 %	Allen-Bradley	
R32	55 26 01 3822	8,2 k Ω	1/4W			10 %	Allen-Bradley	
R33	56 26 00 0101	100 Ω			Variable	20 %	Allen-Bradley	
R34	55 27 18 3820	82 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R35	55 26 01 3470	47 Ω	1/4W			10 %	Allen-Bradley	
R36	55 26 01 3683	68 k Ω	1/4W			10 %	Allen-Bradley	
R37	55 26 01 3104	100 k Ω	1/4W			10 %	Allen-Bradley	
R38	55 27 18 3102	1 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R39	55 26 01 3122	1,2 k Ω	1/4W			10 %	Allen-Bradley	
R40	55 27 18 3103	10 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R41	55 27 18 3103	10 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R42	55 26 01 3473	47 k Ω	1/4W			10 %	Allen-Bradley	
R43	55 26 01 3104	100 k Ω	1/4W			10 %	Allen-Bradley	
R44	55 26 01 3224	220 k Ω	1/4W			10 %	Allen-Bradley	
R45	55 26 01 3104	100 k Ω	1/4W			10 %	Allen-Bradley	
R46	55 26 01 3104	100 k Ω	1/4W			10 %	Allen-Bradley	
R47	55 26 01 3103	10 k Ω	1/4W			10 %	Allen-Bradley	
R48	55 26 01 3104	100 k Ω	1/4W			10 %	Allen-Bradley	
R49	56 30 00 1103	10 k Ω			Variable	20 %	Dralowid	
R50	55 27 18 3223	22 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R51	55 27 18 3104	100 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R52	55 26 01 3224	220 k Ω	1/4W			10 %	Allen-Bradley	
R53	55 26 01 3334	330 k Ω	1/4W			10 %	Allen-Bradley	
R54	55 27 18 3333	33 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R55	55 27 18 3333	33 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R56	55 27 18 3223	22 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R57	55 27 18 3223	22 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R58	55 27 18 3473	47 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R58	55 27 18 3473	47 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R60	55 27 18 3391	390 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R61	55 27 18 3391	390 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R62	55 27 18 3332	3,3 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R63	55 27 18 3332	3,3 k Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R64	55 26 01 3154	150 k Ω	1/4W			10 %	Allen-Bradley	
R65	55 26 01 3223	22 k Ω	1/4W			10 %	Allen-Bradley	

Reference	Kudelski part Number	Description					Manufacturer	Observation
CAPACITORS								
C1	53 22 60 8222	2,2 nF		Polyester	500 V	20 %	Hunts	
C2	53 21 42 7104	100 nF		Polycarbonate	100 V	10 %	Fribourg	
C3	53 22 60 7473	47 nF		Polyester	250 V	20 %	Hunts	
C4	52 12 03 2250	2,2 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C5	53 21 46 7472	4,7 nF		Polycarbonate	160 V	5 %	Fribourg	CCIR only
C6	52 12 03 1550	1,5 µF	Electrolytic	Dry Tantalum	20 V	20 %	Sprague	NAB only
C7	52 12 02 4750	4,7 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C8	52 12 02 4750	4,7 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C9	52 12 01 4700	47 µF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C10	52 12 01 4700	47 µF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C11	52 12 02 4750	4,7 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C12	52 12 02 3900	39 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C13	52 12 02 3900	39 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C14	52 12 04 1050	1 µF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C15	52 12 01 6850	6,8 µF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C16	52 12 04 1050	1 µF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C17	52 12 02 4750	4,7 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C18	52 12 02 4750	4,7 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C19	52 12 02 3900	39 µF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
DIODES								
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D4	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D5	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D6	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D7	51 01 00 2000	Silicon	IX8761	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D8	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D9	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
D10	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania selected		SGS or Sylvania	
TRANSISTORS								
N1	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N1	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N2	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N2	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N3	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N3	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N4	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
N5	50 01 00 3060	Silicon	NPN	DW7021	Factory Selected	(Replaceable by 2N3302)	SGS-Fairchild	
N6	50 00 00 3020	Silicon	NPN	BC108		(Replaceable by 2N3302)	Philips	
N7	50 00 00 3020	Silicon	NPN	BC108		(Replaceable by 2N3302)	Philips	
N8	50 00 00 3020	Silicon	NPN	BC108		(Replaceable by 2N3302)	Philips	
N9	50 00 00 3020	Silicon	NPN	BC108		(Replaceable by 2N3302)	Philips	
N10	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild	
N10	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola	
N11	50 00 00 3020	Silicon	NPN	BC108		(Replaceable by 2N3302)	Philips	
N12	50 00 00 3020	Silicon	NPN	BC108		(Replaceable by 2N3302)	Philips	
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P3	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P3	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P4	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P4	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P5	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P5	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P6	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P6	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P7	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P7	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
P8	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild	
P8	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola	
SWITCH								
	40 46 20 2000	Switch	01-2 × 6	BV510			Elma	
CONNECTORS								
	01 04 78 0002	Pin Male					Kudelski	

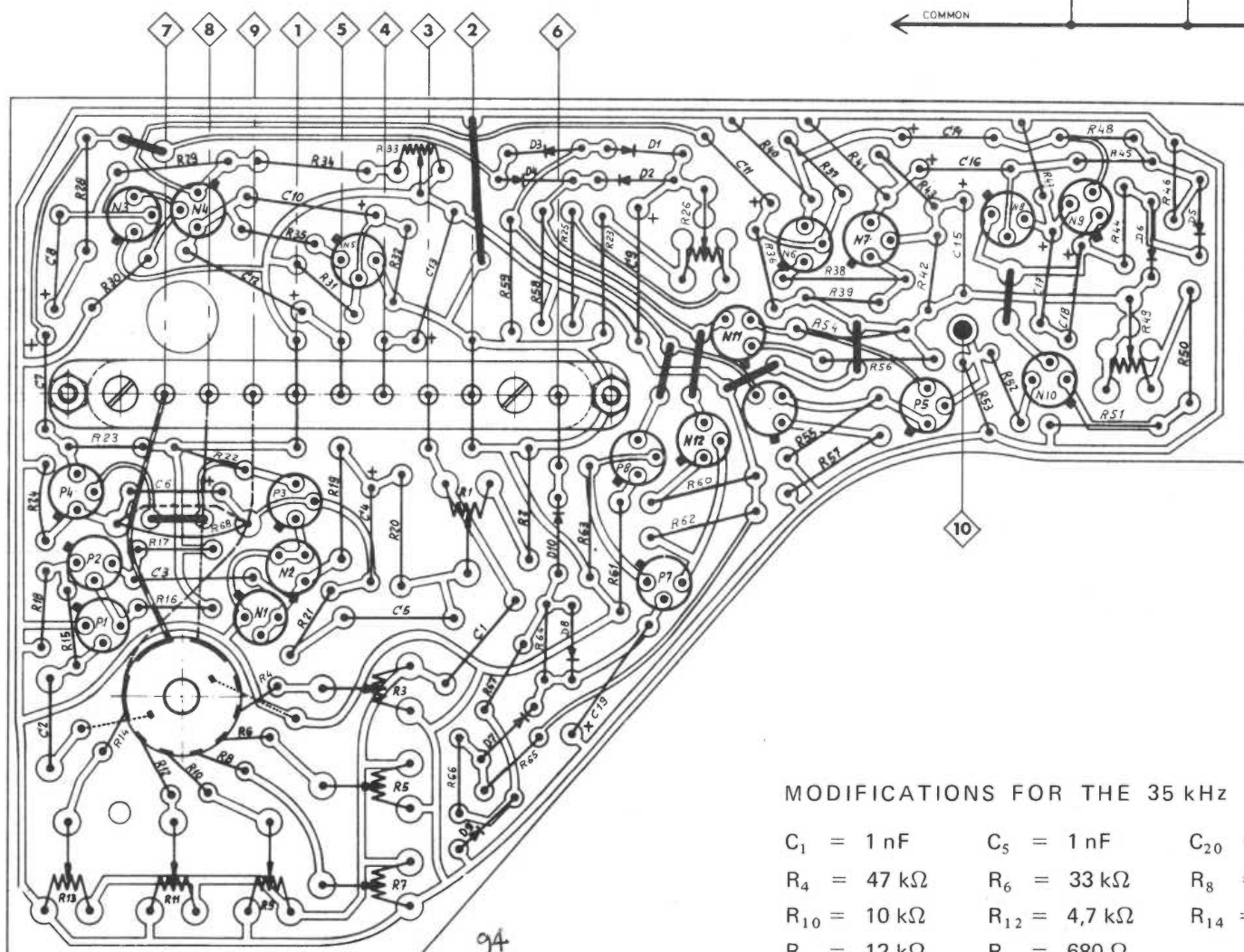


Grounding Pin ∇ inhibits the limiter

UNLESS SPECIFIED

ALL RESISTORS ALLEN-BRADLEY 1/4 W $\pm 10\%$

ALL CAPACITORS $\pm 20\%$



MODIFICATIONS FOR THE 35 kHz CCIR VERSION

$C_1 = 1 \text{ nF}$	$C_5 = 1 \text{ nF}$	$C_{20} = 6,8 \text{ nF}$
$R_4 = 47 \text{ k}\Omega$	$R_6 = 33 \text{ k}\Omega$	$R_8 = 18 \text{ k}\Omega$
$R_{10} = 10 \text{ k}\Omega$	$R_{12} = 4,7 \text{ k}\Omega$	$R_{14} = 1 \text{ k}\Omega$
$R_{21} = 12 \text{ k}\Omega$	$R_{69} = 680 \Omega$	

E5.4

MODIFICATIONS FOR SINGLE SPEED MACHINE 7,5" / s STD
WITHOUT LIMITER

Suppressed $R_3, R_4, R_5, R_6, R_7, R_8, R_{11}, R_{12}, R_{14}$

$R_{13} = 3,3 \text{ k}\Omega$

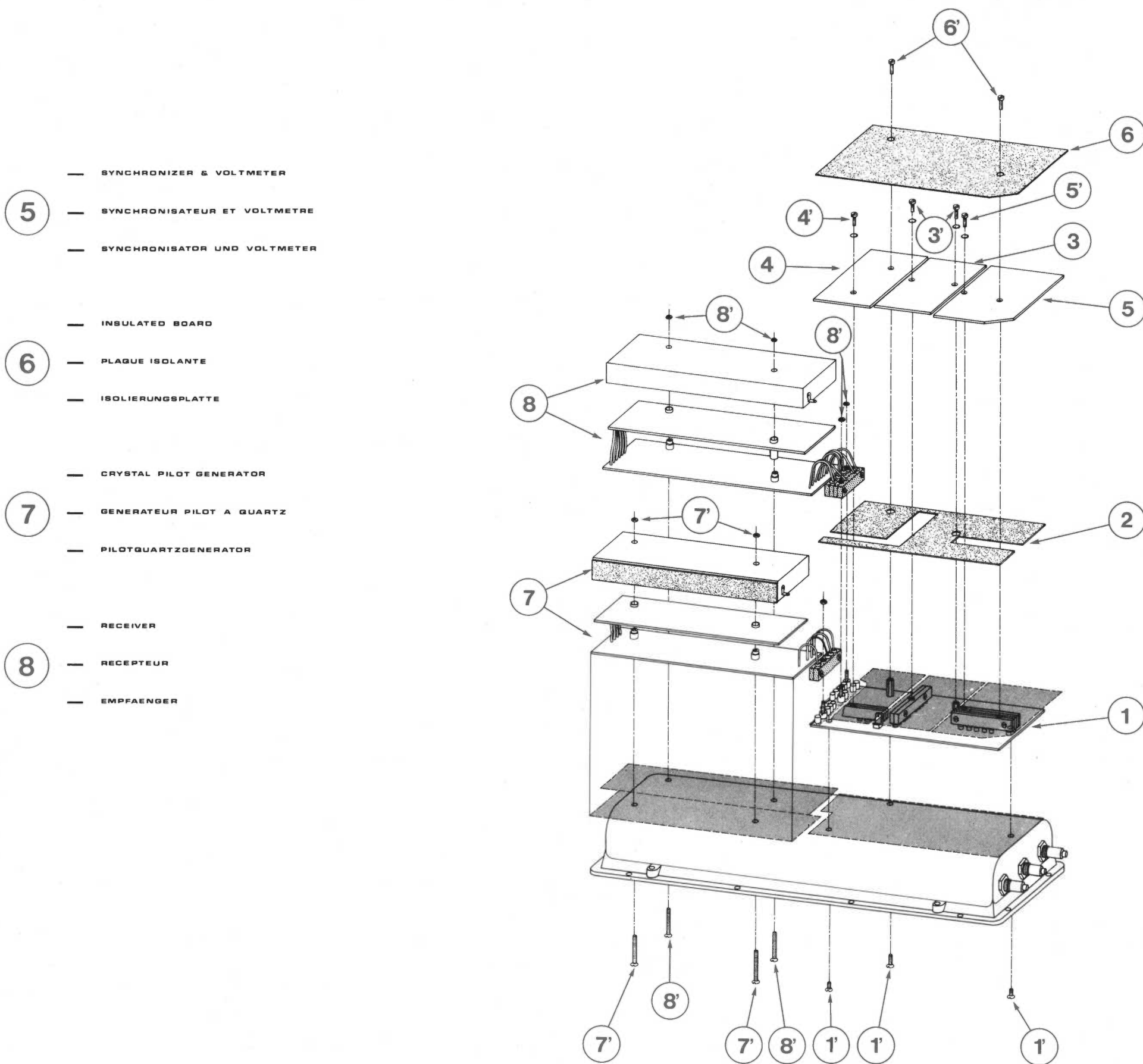
Suppressed $C_{11}, C_{14} \text{ to } C_{18}$

$R_{36} \text{ to } R_{57}$

$N_6 \text{ to } N_{11} \quad P_5, P_6$

D_5, D_6

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX
	This drawing is confidential and may not be divulged in whole or in part to a third party.	CH 1033 Switzerland - Telex 24 392
Date: 6-13-70		NAGRA MAGNETIC RECORDERS INC.
		19 West 44th Street - New York N.Y. 10036
		Phone (212) 661-8066
CIRCUIT DIAGRAM:		Drawn: <i>g/l</i>
RECORDING AMPLIFIER NAGRA IV L & D		Controlled: <i>g/l</i>
Copy:		Printed: <i>g/l</i>
KUDELSKI		09 04 215 0 01

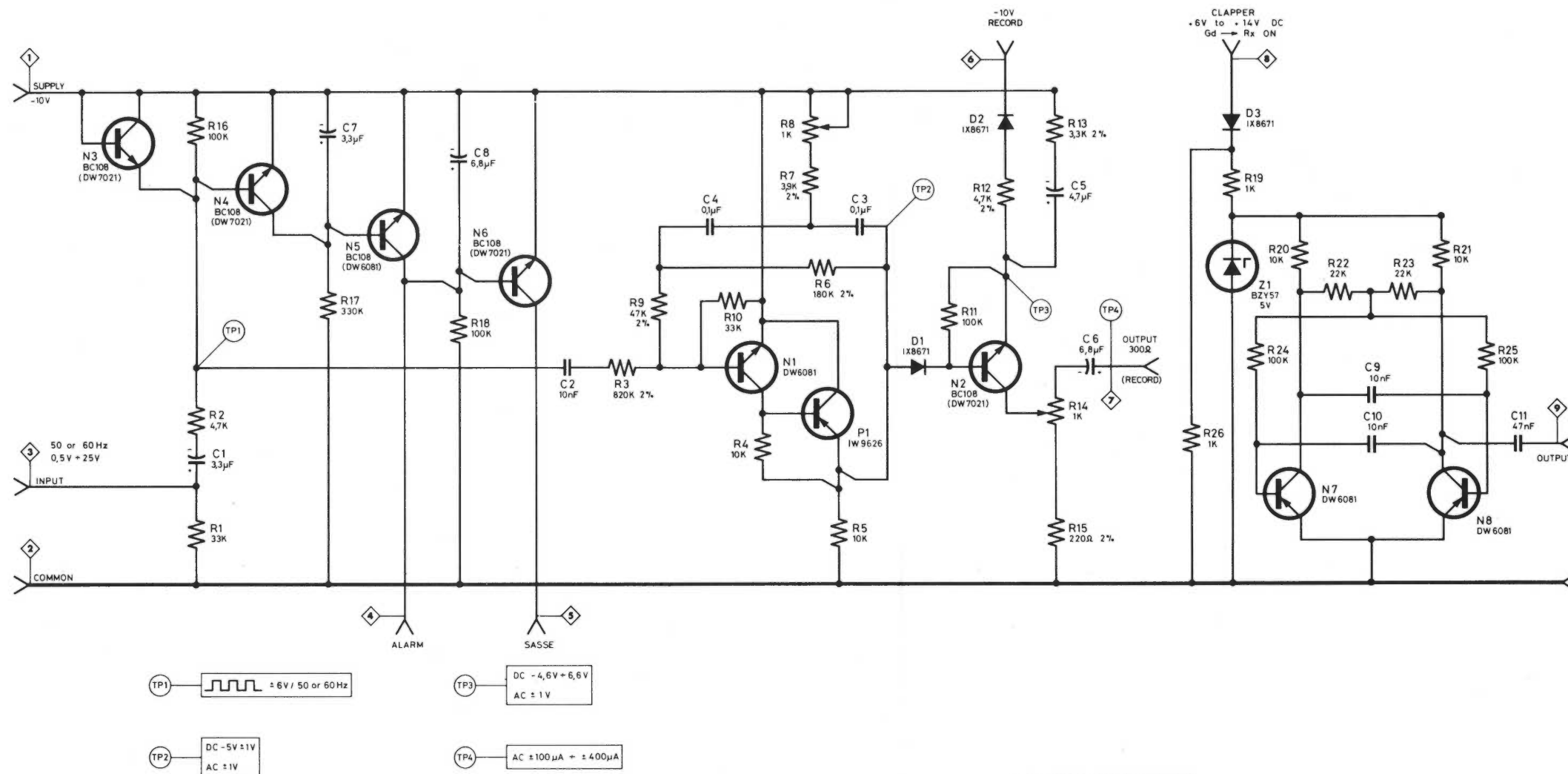


- 1 — INTERCONNECTION
 — INTERCONNEXION
 — VERBINDUNGSKREIS
- 2 — INSULATED BOARD
 — PLAQUE ISOLANTE
 — ISOLIERUNGSPLATTE
- 3 — RECORD PILOT & CLAPPER
 — ENREGISTREMENT PILOT ET CLAQUETTE
 — PILOT AUFNAHMEVERSTAEKER UND STARTMARKIERUNG
- 4 — FREQUENCY METER
 — FREQUENCOMETRE
 — FREQUENZMETER

RECORD PILOT & CLAPPER

PART NUMBER : 09 04 740 0 01

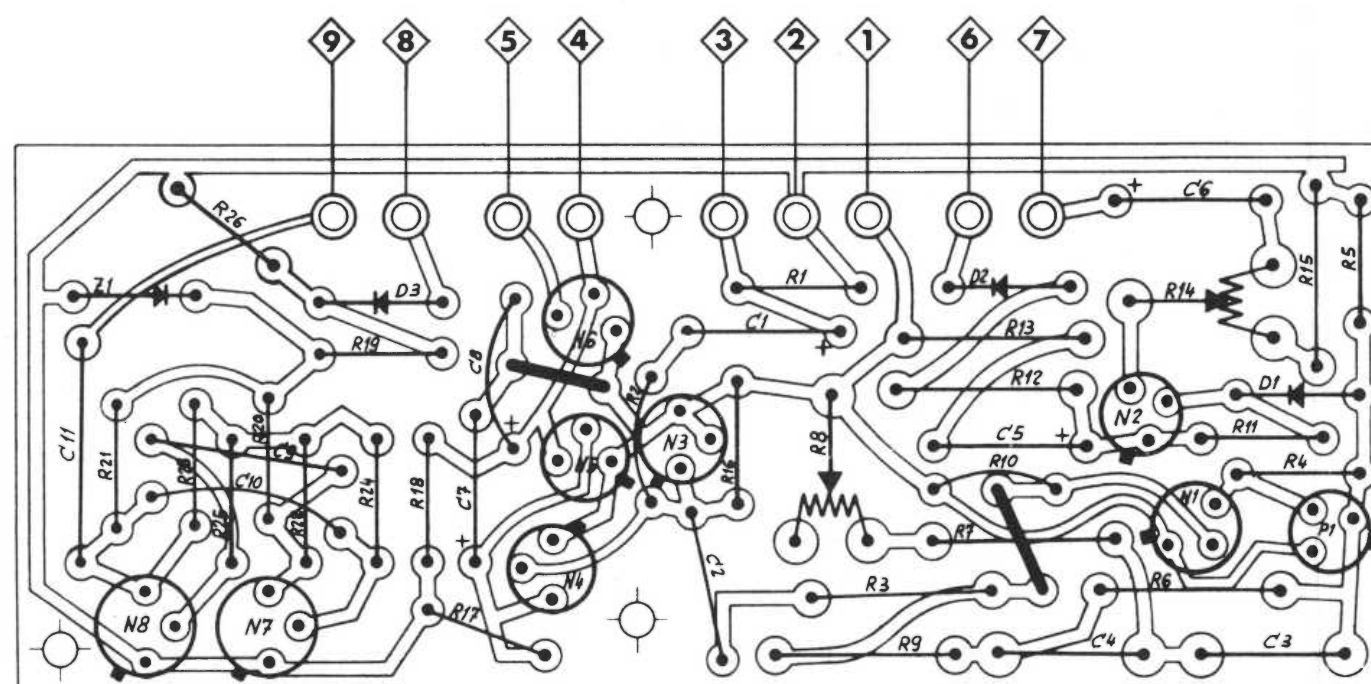
Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3333	33 kΩ 1/4W	10 % Allen-Bradley	
R2	55 26 01 3472	4,7 kΩ 1/4W	10 % Allen-Bradley	
R3	55 27 18 3824	820 kΩ 1/4W	2 % TR5	200 ppm
R4	55 26 01 3103	10 kΩ 1/4W	10 % Allen-Bradley	
R5	55 26 01 3103	10 kΩ 1/4W	10 % Allen-Bradley	
R6	55 27 18 3184	180 kΩ 1/4W	2 % TR5	200 ppm
R7	55 27 18 3392	3,9 kΩ 1/4W	2 % TR5	200 ppm
R8	56 31 00 1102	1k Ω	10 %	Variable Ruwido
R9	55 27 18 3473	47 kΩ 1/4W	2 % TR5	200 ppm
R10	55 26 01 3333	33 kΩ 1/4W	10 % Allen-Bradley	
R11	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R12	55 27 18 3472	4,7 kΩ 1/4W	2 % TR5	200 ppm
R13	55 27 18 3332	3,3 kΩ 1/4W	2 % TR5	200 ppm
R14	56 30 00 1102	1 kΩ	10 %	Variable Ruwido
R15	55 27 18 3221	220 Ω 1/4W	2 % TR5	200 ppm
R16	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R17	55 26 01 3334	330 kΩ 1/4W	10 % Allen-Bradley	
R18	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R19	55 26 01 3102	1 kΩ 1/4W	10 % Allen-Bradley	
R20	55 26 01 3103	10 kΩ 1/4W	10 % Allen-Bradley	
R21	55 26 01 3103	10 kΩ 1/4W	10 % Allen-Bradley	
R22	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R23	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R24	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R25	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R26	55 26 01 3102	1 kΩ 1/4W	10 % Allen-Bradley	
CAPACITORS				
C1	52 12 03 3350	3,3 μF Electrolytic	Dry Tantalum 15 V	20 % Sprague
C2	53 22 60 7103	10 nF	Polyester 250 V	20 % Hunts
C3	53 21 42 7104	100 nF	Polycarbonate 100 V	20 % Fribourg
C4	53 21 42 7104	100 nF	Polycarbonate 100 V	20 % Fribourg
C5	52 12 02 4750	4,7 μF Electrolytic	Dry Tantalum 10 V	20 % Sprague
C6	52 12 01 6850	6,8 μF Electrolytic	Dry Tantalum 6 V	20 % Sprague
C7	52 12 03 3350	3,3 μF Electrolytic	Dry Tantalum 15 V	20 % Sprague
C8	52 12 01 6850	6,8 μF Electrolytic	Dry Tantalum 6 V	20 % Sprague
C9	53 22 60 7103	10 nF	Polyester 250 V	20 % Hunts
C10	53 22 60 7103	10 nF	Polyester 250 V	20 % Hunts
C11	53 22 60 7473	47 nF	Polyester 250 V	20 % Hunts
DIODES				
D1	51 01 00 2000	Silicon IX8671	SGS or 1N4148 Sylvania	SGS or Sylvania
D2	51 01 00 2000	Silicon IX8671	SGS or 1N4148 Sylvania	SGS or Sylvania
D3	51 01 00 2000	Silicon IX8671	SGS or 1N4148 Sylvania	SGS or Sylvania
Z1	51 09 00 4010	Silicon Zener 752A	Motorola or BZY 57 Philips	Motorola or Philips
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N2	50 01 00 3060	Silicon NPN DW7021	Factory Selected (Replaceable by 2N3302)	SGS-Fairchild
N2	50 00 00 3020	Silicon NPN BC108	(Replaceable by 2N3302)	Philips
N3	50 01 00 3060	Silicon NPN DW7021	Factory Selected (Replaceable by 2N3302)	SGS-Fairchild
N3	50 00 00 3020	Silicon NPN BC108	(Replaceable by 2N3302)	Philips
N4	50 01 00 3060	Silicon NPN DW7021	Factory Selected (Replaceable by 2N3302)	SGS-Fairchild
N4	50 00 00 3020	Silicon NPN BC108	(Replaceable by 2N3302)	Philips
N5	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N5	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N6	50 01 00 3060	Silicon NPN DW7021	Factory Selected (Replaceable by 2N3302)	SGS-Fairchild
N6	50 00 00 3020	Silicon NPN BC108	(Replaceable by 2N3302)	Philips
N7	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N7	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N8	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N8	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
CONNECTORS				
	01 04 21 0003	Pin Female		Kudelski



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10 \%$

ALL CAPACITORS $\pm 20 \%$



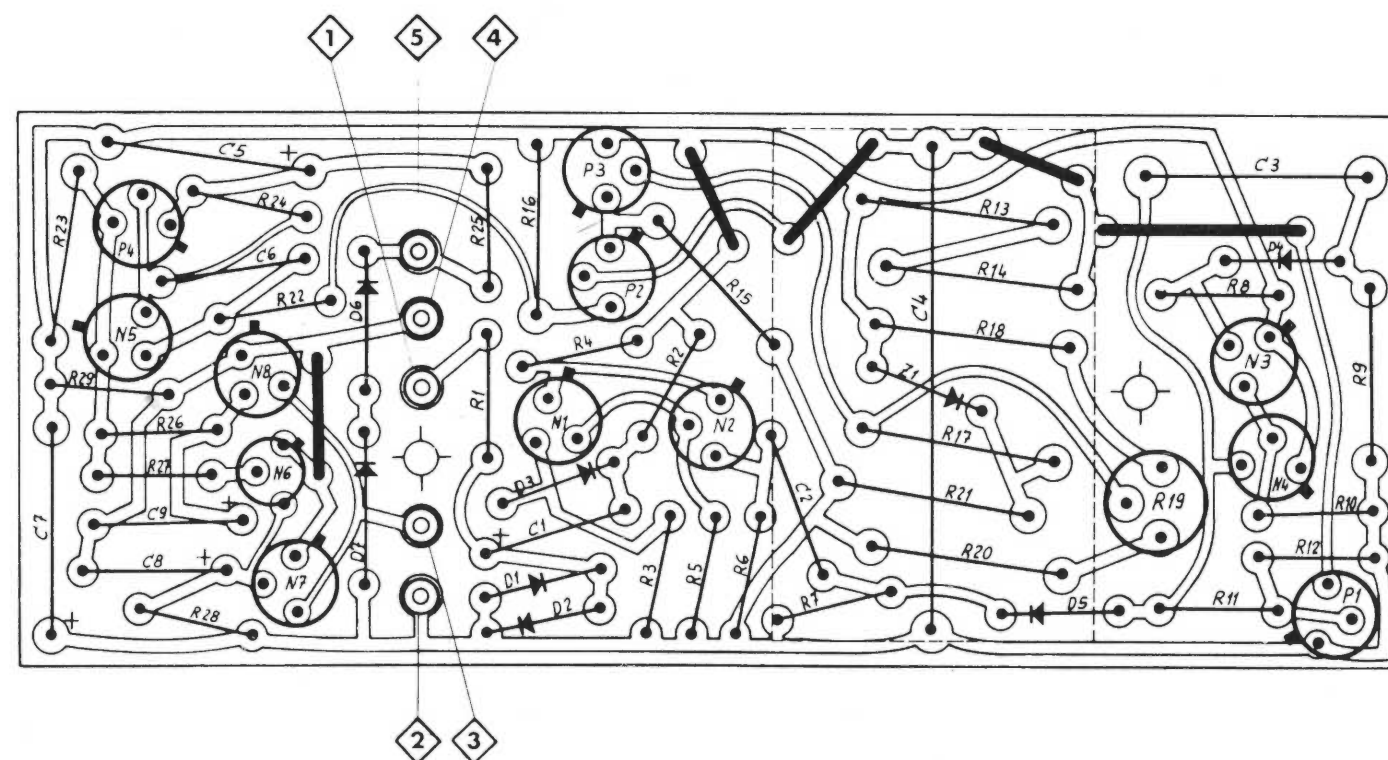
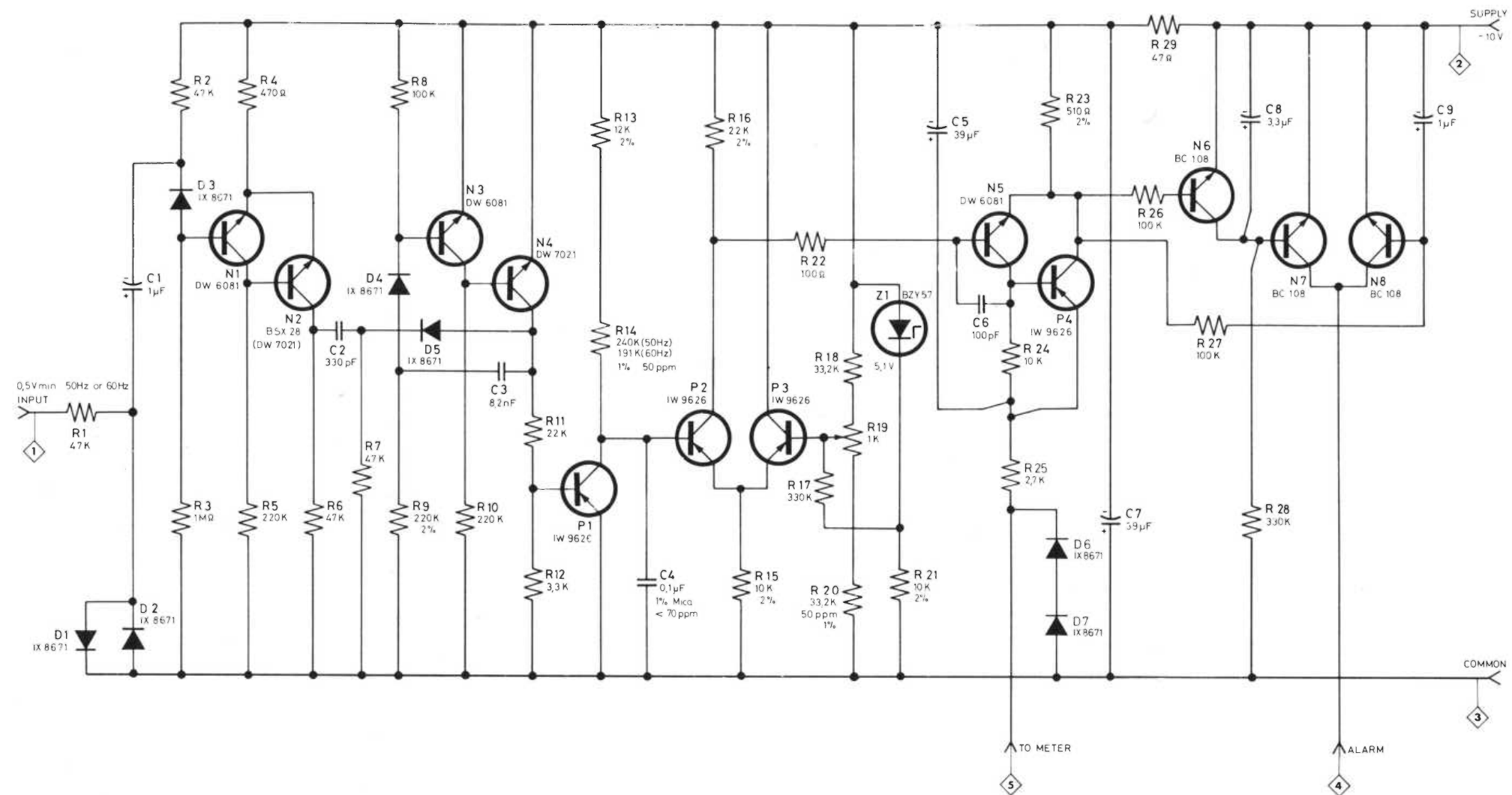
E6.1

Modification:	Valid from ser. N°:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 7 23 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 681-8088
CIRCUIT DIAGRAM:		
RECORD PILOT & CLAPPER		
Copy:	KUDELSKI	09 04 740 0 01
Drawn:	Controlled:	Checked:
Printed:		

FREQUENCY METER QFM

PART NUMBER : 09 04 700 0 01

Reference	Kudelski part Number	Description	Manufacturer	Observation
RESISTORS				
R1	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R2	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R3	55 26 01 3105	1 MΩ 1/4W	10 % Allen-Bradley	
R4	55 26 01 3471	470 Ω 1/4W	10 % Allen-Bradley	
R5	55 26 01 3224	220 kΩ 1/4W	10 % Allen-Bradley	
R6	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R7	55 26 01 3473	47 kΩ 1/4W	10 % Allen-Bradley	
R8	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R9	55 27 18 3224	220 kΩ 1/4W	2 % Electrosil	
R10	55 26 01 3224	220 kΩ 1/4W	10 % Allen-Bradley	
R11	55 26 01 3223	22 kΩ 1/4W	10 % Allen-Bradley	
R12	55 26 01 3332	3,3 kΩ 1/4W	10 % Allen-Bradley	
R13	55 27 18 3822	8,2 kΩ 1/4W	2 % Electrosil	NAB only
R13	55 27 18 3123	12 kΩ 1/4W	2 % Electrosil	CCIR only
R14	55 27 21 3204	191 kΩ 1/4W	0,2 % Electrosil	NAB only
R14	55 27 21 3244	240 kΩ 1/4W	0,2 % Electrosil	CCIR only
R15	55 27 18 3103	10 kΩ 1/4W	2 % Electrosil	
R16	55 27 18 3223	22 kΩ 1/4W	2 % Electrosil	
R17	55 27 18 3334	330 kΩ 1/4W	2 % Electrosil	
R18	55 27 13 3333	33,2 kΩ 1/4W	0,2 % Electrosil	
R19	56 26 00 0102	1 kΩ 1/4W	10 % Allen-Bradley	
R20	55 27 13 3333	33,2 kΩ 1/4W	0,2 % Electrosil	
R21	55 27 18 3103	10 kΩ 1/4W	2 % Electrosil	
R22	55 26 01 3101	100 Ω 1/4W	10 % Allen-Bradley	
R23	55 27 18 3511	510 Ω 1/4W	2 % Electrosil	
R24	55 26 01 3103	10 kΩ 1/4W	10 % Allen-Bradley	
R25	55 26 01 3272	2,7 kΩ 1/4W	10 % Allen-Bradley	
R26	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R27	55 26 01 3104	100 kΩ 1/4W	10 % Allen-Bradley	
R28	55 26 01 3334	330 kΩ 1/4W	10 % Allen-Bradley	
R29	55 26 01 3470	47 Ω 1/4W	10 % Allen-Bradley	
CAPACITORS				
C1	52 12 04 1050	1 μF Electrolytic	20 % Sprague	
C2	53 32 04 8331	330 pF Ceramic	20 % ERIE	
C3	53 00 50 5822	8,2 nF Polystyrene	1 % Philips	
C4	53 21 58 7104	0,1 μF Mica	1 % Fribourg	
C5	52 12 02 3900	39 μF Electrolytic	20 % Sprague	
C6	53 32 04 8101	100 pF Ceramic	20 % ERIE	
C7	52 12 02 3900	39 μF Electrolytic	20 % Sprague	
C8	52 12 03 3350	3,3 μF Electrolytic	20 % Sprague	
C9	52 12 04 1050	1 μF Electrolytic	20 % Sprague	
DIODES				
D1	51 01 00 2000	Silicon IX8671	SGS or 1N4148	SGS or Sylvania
D2	51 01 00 2000	Silicon IX8671	SGS or 1N4148	SGS or Sylvania
D3	51 01 00 2000	Silicon IX8671	SGS or 1N4148	SGS or Sylvania
D4	51 01 00 2000	Silicon IX8671	SGS or 1N4148	SGS or Sylvania
D5	51 01 00 2000	Silicon IX8671	SGS or 1N4148	SGS or Sylvania
D6	51 01 00 2000	Silicon IX8671	SGS or 1N4148	SGS or Sylvania
D7	51 01 00 2000	Silicon IX8671	SGS or 1N4148	SGS or Sylvania
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N2	50 01 00 3130	Silicon NPN BSX28	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N2	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N3	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N3	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N4	50 01 00 3060	Silicon NPN DW7021	Factory Selected (Replaceable by 2N3302)	SGS-Fairchild
N4	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N5	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N5	50 09 00 3000	Silicon NPN ES8063	Factory Selected (Replaceable by 2N2484)	Motorola
N6	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N6	50 00 00 3020	Silicon NPN BC108	(Replaceable by 2N2484)	Philips
N7	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N7	50 00 00 3020	Silicon NPN BC108	(Replaceable by 2N2484)	Philips
N8	50 01 00 3000	Silicon NPN DW6081	Factory Selected (Replaceable by 2N2484)	SGS-Fairchild
N8	50 00 00 3020	Silicon NPN BC108	(Replaceable by 2N2484)	Philips
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P3	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P3	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
P4	50 01 00 2000	Silicon PNP IW9626	Factory Selected (Replaceable by 2N3962)	SGS-Fairchild
P4	50 09 00 2000	Silicon PNP ES6303	Factory Selected (Replaceable by 2N3962)	Motorola
CONNECTORS				
	01 04 21 0003	Pin Female	Kudelski	



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$
ALL CAPACITORS $\pm 20\%$

E6.2

Modification:	Valid from ser. No:	KUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 Switzerland - Telex 24 392
Date: 7 9 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 661-8056
CIRCUIT DIAGRAM:		
FREQUENCY METER QFM		
Copy:	KUDELSKI	09 04 700 0 01
		Drawn: [Signature] Controlled: [Signature] Checked: [Signature] Printed: [Signature]

QSLI SYNCHRONIZER & V - METER

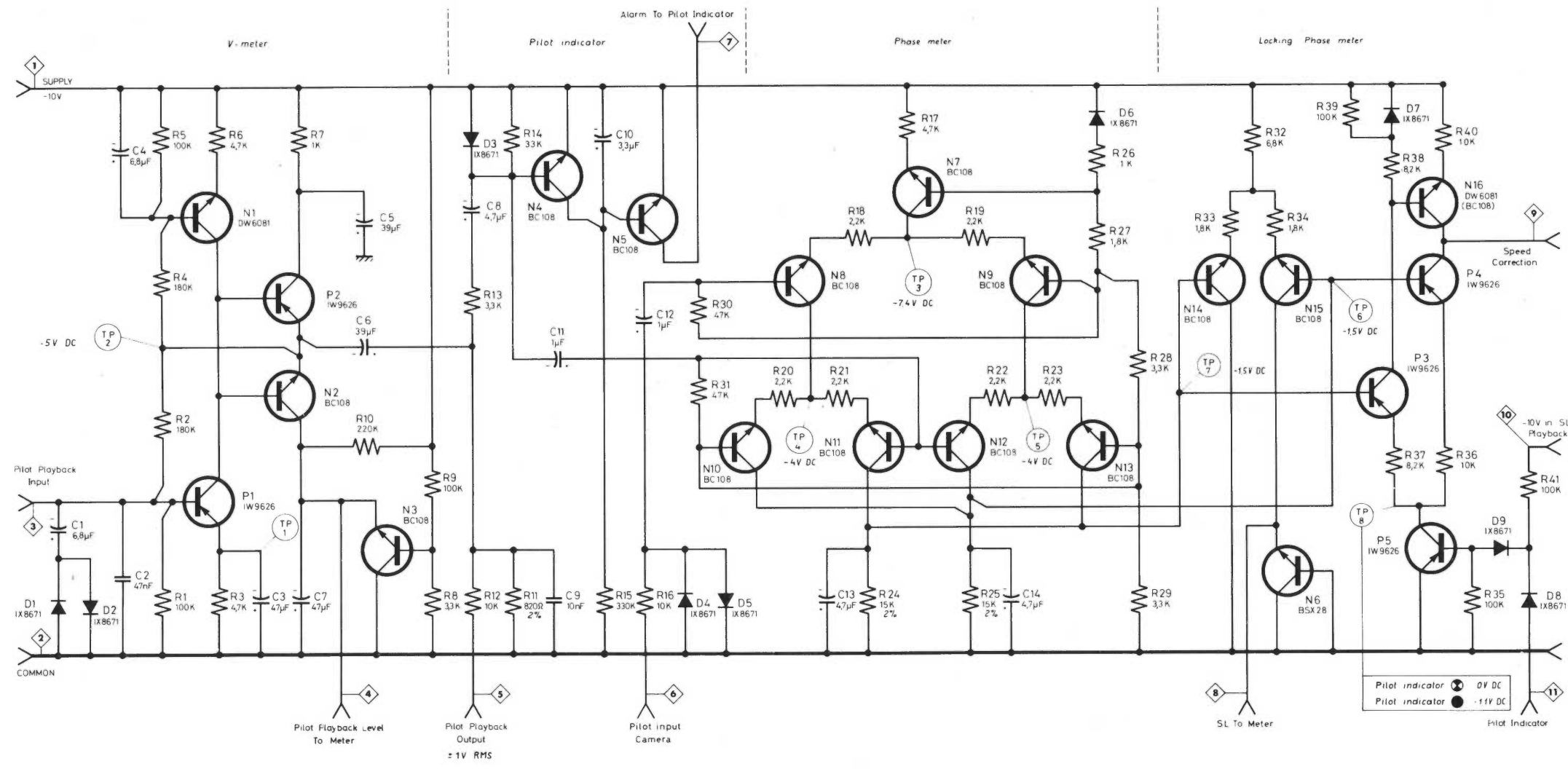
PART NUMBER : 09 04 750 0 01

QSLI SYNCHRONIZER & V - METER

PART NUMBER : 09 04 750 0 01

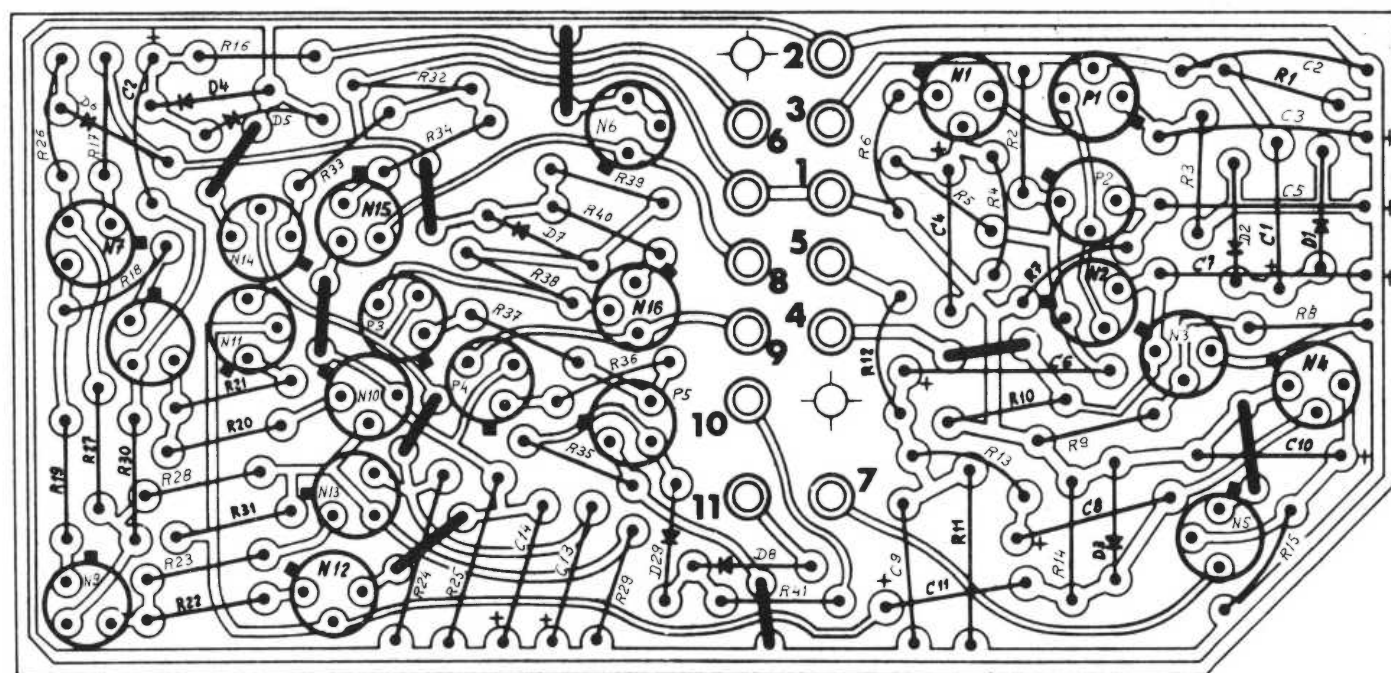
Reference	Kudelski part Number	Description					Manufacturer	Observation
RESISTORS								
R1	55 26 01 3104	100 kΩ	1/4W	TR4	200 ppm	10 %	Allen-Bradley	
R2	55 27 19 3184	180 kΩ	1/4W			2 %	Electrosil	
R3	55 26 01 3472	4,7 kΩ	1/4W			10 %	Allen-Bradley	
R4	55 26 01 3184	180 kΩ	1/4W			10 %	Allen-Bradley	
R5	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R6	55 26 01 3472	4,7 kΩ	1/4W			10 %	Allen-Bradley	
R7	55 26 01 3102	1 kΩ	1/4W			10 %	Allen-Bradley	
R8	55 26 01 3332	3,3 kΩ	1/4W			10 %	Allen-Bradley	
R9	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R10	55 26 01 3224	220 kΩ	1/4W			10 %	Allen-Bradley	
R11	55 27 18 3821	820 Ω	1/4W	TR5	200 ppm	2 %	Electrosil	
R12	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R13	55 26 01 3332	3,3 kΩ	1/4W			10 %	Allen-Bradley	
R14	55 26 01 3333	33 kΩ	1/4W			10 %	Allen-Bradley	
R15	55 26 01 3334	330 kΩ	1/4W			10 %	Allen-Bradley	
R16	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R17	55 26 01 3472	4,7 kΩ	1/4W			10 %	Allen-Bradley	
R18	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R19	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R20	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R21	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R22	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R23	55 26 01 3222	2,2 kΩ	1/4W			10 %	Allen-Bradley	
R24	55 27 18 3153	15 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R25	55 27 18 3153	15 kΩ	1/4W	TR5	200 ppm	2 %	Electrosil	
R26	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R27	55 26 01 3182	1,8 kΩ	1/4W			10 %	Allen-Bradley	
R28	55 26 01 3332	3,3 kΩ	1/4W			10 %	Allen-Bradley	
R29	55 26 01 3332	3,3 kΩ	1/4W			10 %	Allen-Bradley	
R30	55 26 01 3473	47 kΩ	1/4W			10 %	Allen-Bradley	
R31	55 26 01 3473	47 kΩ	1/4W			10 %	Allen-Bradley	
R32	55 26 01 3682	6,8 kΩ	1/4W			10 %	Allen-Bradley	
R33	55 26 01 3182	1,8 kΩ	1/4W			10 %	Allen-Bradley	
R34	55 26 01 3182	1,8 kΩ	1/4W			10 %	Allen-Bradley	
R35	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R36	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R37	55 26 01 3822	8,2 kΩ	1/4W			10 %	Allen-Bradley	
R38	55 26 01 3822	8,2 kΩ	1/4W			10 %	Allen-Bradley	
R39	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
R40	55 26 01 3103	10 kΩ	1/4W			10 %	Allen-Bradley	
R41	55 26 01 3104	100 kΩ	1/4W			10 %	Allen-Bradley	
CAPACITORS								
C1	52 12 01 6850	6,8 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C2	53 22 60 7473	47 nF		Polyester	250 V	20 %	Hunts	
C3	52 12 01 4700	47 nF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C4	52 12 01 6850	6,8 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C5	52 12 02 3900	39 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C6	52 12 02 3900	39 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C7	52 12 01 4700	47 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C8	52 12 02 4750	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C9	53 22 60 7103	10 nF		Polyester	250 V	20 %	Hunts	
C10	52 12 00 3350	3,3 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C11	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C12	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C13	52 12 02 4750	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
C14	52 12 02 4750	4,7 μF	Electrolytic	Dry Tantalum	10 V	20 %	Sprague	
DIODES								
D1	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D2	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D3	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D4	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D5	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D6	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D7	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D8	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	
D9	51 01 00 2000	Silicon	IX8671	SGS or 1N4148	Sylvania		SGS or Sylvania	

Reference	Kudelski part Number	Description	Manufacturer	Observation
TRANSISTORS				
N1	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N1	50 09 00 3000	Silicon NPN ES8063	Factory Selected	(Replaceable by 2N2484) Motorola
N2	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N2	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N3	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N3	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N4	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N5	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N5	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N6	50 01 00 3130	Silicon NPN BSX28		SGS-Fairchild
N7	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N7	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N8	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N8	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N9	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N9	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N10	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N10	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N11	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N11	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N12	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N12	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N13	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N13	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N14	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N14	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N15	50 00 00 3020	Silicon NPN BC108		(Replaceable by 2N2484) Philips
N16	50 01 00 3000	Silicon NPN DW6081	Factory Selected	(Replaceable by 2N2484) SGS-Fairchild
N16	50 09 00 3000	Silicon NPN ES8063	Factory Selected	(Replaceable by 2N2484) Motorola
P1	50 01 00 2000	Silicon PNP IW9626	Factory Selected	(Replaceable by 2N3962) SGS-Fairchild
P1	50 09 00 2000	Silicon PNP ES6303	Factory Selected	(Replaceable by 2N3962) Motorola
P2	50 01 00 2000	Silicon PNP IW9626	Factory Selected	(Replaceable by 2N3962) SGS-Fairchild
P2	50 09 00 2000	Silicon PNP ES6303	Factory Selected	(Replaceable by 2N3962) Motorola
P3	50 01 00 2000	Silicon PNP IW9626	Factory Selected	(Replaceable by 2N3962) SGS-Fairchild
P3	50 09 00 2000	Silicon PNP ES6303	Factory Selected	(Replaceable by 2N3962) Motorola
P4	50 01 00 2000	Silicon PNP IW9626	Factory Selected	(Replaceable by 2N3962) SGS-Fairchild
P4	50 09 00 2000	Silicon PNP ES6303	Factory Selected	(Replaceable by 2N3962) Motorola
P5	50 01 00 2000	Silicon PNP IW9626	Factory Selected	(Replaceable by 2N3962) SGS-Fairchild
P5	50 09 00 2000	Silicon PNP ES6303	Factory Selected	(Replaceable by 2N3962) Motorola
CONNECTORS				
	01 04 21 0004	Pin Female	Kudelski	



UNLESS SPECIFIED

ALL RESISTORS ALLEN BRADLEY 1/4 W $\pm 10\%$
ALL CAPACITORS $\pm 20\%$



Modification:	Valid from ser. No.:	KUDELSKI - Dept. NAGRA - CHESEAU
	This drawing is confidential and may not be divulged in whole or in part to a third party.	CH 1933 Switzerland - Telex 24 382
Date: 6 29 70		NAGRA MAGNETIC RECORDERS INC.
		19 West 44th Street - New York N.Y. 10036
		Phone: (212) 641-8888
CIRCUIT DIAGRAM:		Drawn: 2/1/70
QSLI SYNCHRONIZER & V-METER		Controlled: 2/1/70
Copy:		Checked: 2/1/70
KUDELSKI		Printed: 2/1/70
09 04 750 0 01		

E6.3

QGX CRYSTAL PILOT GENERATOR

PART NUMBER : 09 04 694 0 01

QGX CRYSTAL PILOT GENERATOR

ELECTRICAL PART LIST

PART NUMBER : 09 04 694 0 01

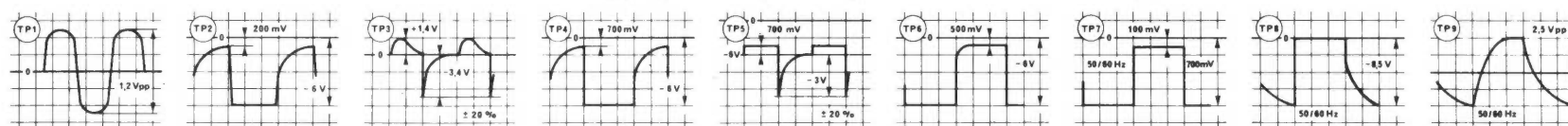
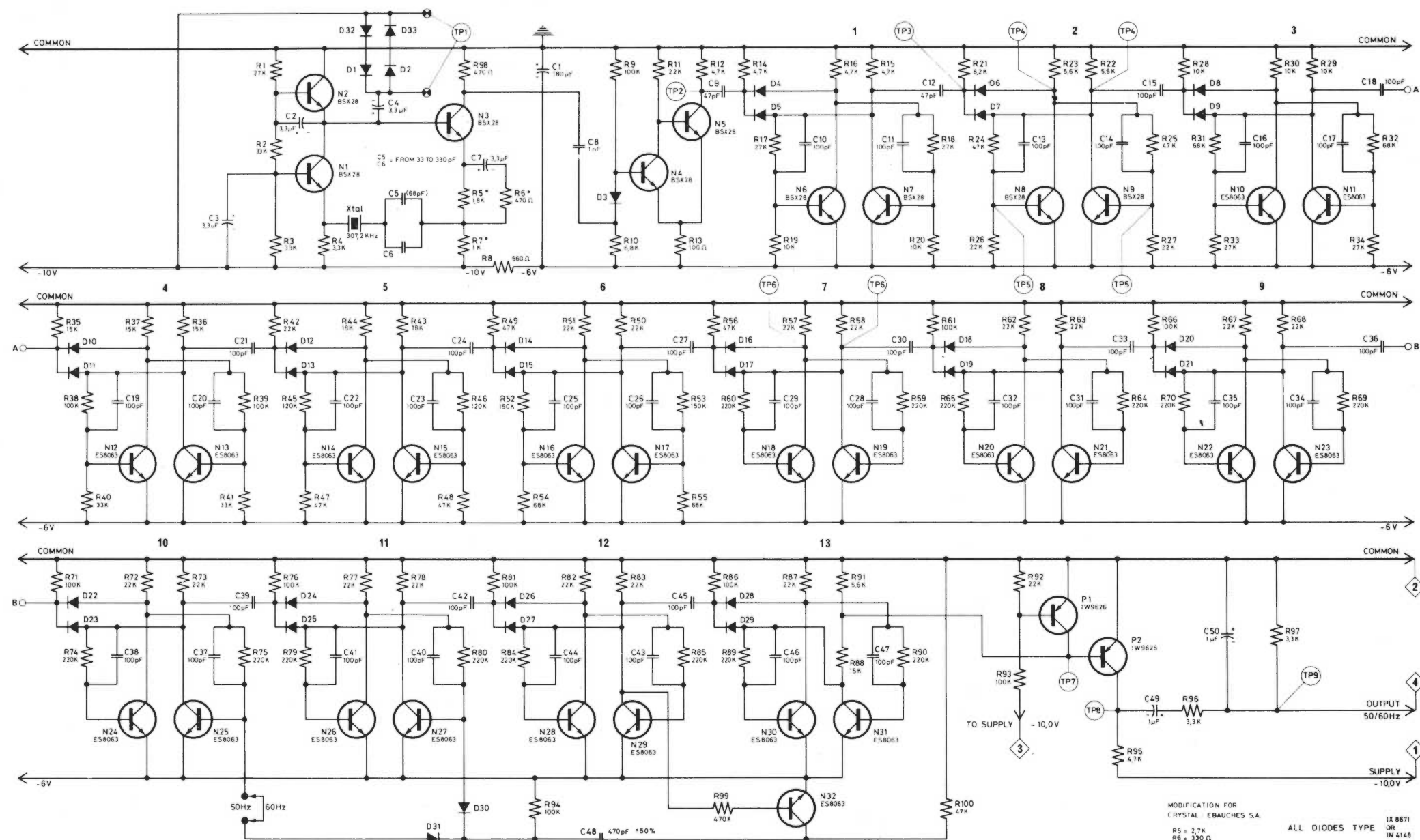
Reference	Kudelski part Number	Designation			Manufacturer	Observation
RESISTORS						
R1	55 26 01 3273	27 kΩ	1/4W	10 %	Allen-Bradley	
R2	55 26 01 3333	33 kΩ	1/4W	10 %	Allen-Bradley	
R3	55 26 01 3333	33 kΩ	1/4W	10 %	Allen-Bradley	
R4	55 26 01 3332	3,3 kΩ	1/4W	10 %	Allen-Bradley	
R5	55 26 01 3182	1,8 kΩ	1/4W	10 %	Allen-Bradley	
R6	55 26 01 3471	470 Ω	1/4W	10 %	Allen-Bradley	
R7	55 26 01 3102	1 kΩ	1/4W	10 %	Allen-Bradley	
R5	55 26 01 3272	2,7 kΩ	1/4W	10 %	Allen-Bradley	} Ebauches S.A. Crystal Only
R6	55 26 01 3331	330 Ω	1/4W	10 %	Allen-Bradley	
R7	55 26 01 3101	100 Ω	1/4W	10 %	Allen-Bradley	
R8	55 26 01 3561	560 Ω	1/4W	10 %	Allen-Bradley	
R9	55 26 01 3104	100 kΩ	1/4W	10 %	Allen-Bradley	
R10	55 26 01 3682	6,8 kΩ	1/4W	10 %	Allen-Bradley	
R11	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R12	55 26 01 3472	4,7 kΩ	1/4W	10 %	Allen-Bradley	
R13	55 26 01 3101	100 Ω	1/4W	10 %	Allen-Bradley	
R14	55 26 01 3472	4,7 kΩ	1/4W	10 %	Allen-Bradley	
R15	55 26 01 3472	4,7 kΩ	1/4W	10 %	Allen-Bradley	
R16	55 26 01 3472	4,7 kΩ	1/4W	10 %	Allen-Bradley	
R17	55 26 01 3273	27 kΩ	1/4W	10 %	Allen-Bradley	
R18	55 26 01 3273	27 kΩ	1/4W	10 %	Allen-Bradley	
R19	55 26 01 3103	10 kΩ	1/4W	10 %	Allen-Bradley	
R20	55 26 01 3103	10 kΩ	1/4W	10 %	Allen-Bradley	
R21	55 26 01 3822	8,2 kΩ	1/4W	10 %	Allen-Bradley	
R22	55 26 01 3562	5,6 kΩ	1/4W	10 %	Allen-Bradley	
R23	55 26 01 3562	5,6 kΩ	1/4W	10 %	Allen-Bradley	
R24	55 26 01 3473	47 kΩ	1/4W	10 %	Allen-Bradley	
R25	55 26 01 3473	47 kΩ	1/4W	10 %	Allen-Bradley	
R26	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R27	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R28	55 26 01 3103	10 kΩ	1/4W	10 %	Allen-Bradley	
R29	55 26 01 3103	10 kΩ	1/4W	10 %	Allen-Bradley	
R30	55 26 01 3103	10 kΩ	1/4W	10 %	Allen-Bradley	
R31	55 26 01 3683	68 kΩ	1/4W	10 %	Allen-Bradley	
R32	55 26 01 3683	68 kΩ	1/4W	10 %	Allen-Bradley	
R33	55 26 01 3273	27 kΩ	1/4W	10 %	Allen-Bradley	
R34	55 26 01 3273	27 kΩ	1/4W	10 %	Allen-Bradley	
R35	55 26 01 3153	15 kΩ	1/4W	10 %	Allen-Bradley	
R36	55 26 01 3153	15 kΩ	1/4W	10 %	Allen-Bradley	
R37	55 26 01 3153	15 kΩ	1/4W	10 %	Allen-Bradley	
R38	55 26 01 3104	100 kΩ	1/4W	10 %	Allen-Bradley	
R39	55 26 01 3104	100 kΩ	1/4W	10 %	Allen-Bradley	
R40	55 26 01 3333	33 kΩ	1/4W	10 %	Allen-Bradley	
R41	55 26 01 3333	33 kΩ	1/4W	10 %	Allen-Bradley	
R42	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R43	55 26 01 3183	18 kΩ	1/4W	10 %	Allen-Bradley	
R44	55 26 01 3183	18 kΩ	1/4W	10 %	Allen-Bradley	
R45	55 26 01 3124	120 kΩ	1/4W	10 %	Allen-Bradley	
R46	55 26 01 3124	120 kΩ	1/4W	10 %	Allen-Bradley	
R47	55 26 01 3473	47 kΩ	1/4W	10 %	Allen-Bradley	
R48	55 26 01 3473	47 kΩ	1/4W	10 %	Allen-Bradley	
R49	55 26 01 3473	47 kΩ	1/4W	10 %	Allen-Bradley	
R50	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R51	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R52	55 26 01 3154	150 kΩ	1/4W	10 %	Allen-Bradley	
R53	55 26 01 3154	150 kΩ	1/4W	10 %	Allen-Bradley	
R54	55 26 01 3683	68 kΩ	1/4W	10 %	Allen-Bradley	
R55	55 26 01 3683	68 kΩ	1/4W	10 %	Allen-Bradley	
R56	55 26 01 3473	47 kΩ	1/4W	10 %	Allen-Bradley	
R57	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R58	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R59	55 26 01 3224	220 kΩ	1/4W	10 %	Allen-Bradley	
R60	55 26 01 3224	220 kΩ	1/4W	10 %	Allen-Bradley	
R61	55 26 01 3104	100 kΩ	1/4W	10 %	Allen-Bradley	
R62	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R63	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R64	55 26 01 3224	220 kΩ	1/4W	10 %	Allen-Bradley	
R65	55 26 01 3224	220 kΩ	1/4W	10 %	Allen-Bradley	
R66	55 26 01 3104	100 kΩ	1/4W	10 %	Allen-Bradley	
R67	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R68	55 26 01 3223	22 kΩ	1/4W	10 %	Allen-Bradley	
R69	55 26 01 3224	220 kΩ	1/4W	10 %	Allen-Bradley	
R70	55 26 01 3224	220 kΩ	1/4W	10 %	Allen-Bradley	
R71	55 26 01 3104	100 kΩ	1/4W	10 %	Allen-Bradley	

Reference	Kudelski part Number	Designation				Manufacturer	Observation
R72	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R73	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R74	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R75	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R76	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R77	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R78	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R79	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R80	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R81	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R82	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R83	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R84	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R85	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R86	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R87	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R88	55 26 01 3153	15 kΩ	1/4W		10 %	Allen-Bradley	
R89	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R90	55 26 01 3224	220 kΩ	1/4W		10 %	Allen-Bradley	
R91	55 26 01 3562	5,6 kΩ	1/4W		10 %	Allen-Bradley	
R92	55 26 01 3223	22 kΩ	1/4W		10 %	Allen-Bradley	
R93	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R94	55 26 01 3104	100 kΩ	1/4W		10 %	Allen-Bradley	
R95	55 26 01 3472	4,7 kΩ	1/4W		10 %	Allen-Bradley	
R96	55 26 01 3332	3,3 kΩ	1/4W		10 %	Allen-Bradley	
R97	55 26 01 3332	3,3 kΩ	1/4W		10 %	Allen-Bradley	
R98	55 26 01 3471	470 Ω	1/4W		10 %	Allen-Bradley	
R99	55 26 01 3474	470 kΩ	1/4W		10 %	Allen-Bradley	
R100	55 26 01 3473	47 kΩ	1/4W		10 %	Allen-Bradley	

CAPACITORS

C1	52 12 01 1810	180 μF	Electrolytic	Dry Tantalum	6 V	20 %	Sprague	
C2	52 12 03 3350	3,3 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C3	52 12 03 3350	3,3 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C4	52 12 03 3350	3,3 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C5	53 32 04 8680	68 pF		Ceramic	500 V	20 %	ERIE	
C6				Ceramic	500 V	20 %	ERIE	Adjusted
C7	52 12 03 3350	3,3 μF	Electrolytic	Dry Tantalum	15 V	20 %	Sprague	
C8	53 22 60 8102	1 nF		Polyethylene	500 V	20 %	Hunts	
C9	53 32 04 8470	47 pF		Ceramic	500 V	20 %	ERIE	
C10	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C11	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C12	53 32 04 8470	47 pF		Ceramic	500 V	20 %	ERIE	
C13	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C14	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C15	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C16	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C17	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C18	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C19	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C20	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C21	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C22	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C23	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C24	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C25	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C26	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C27	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C28	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C29	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C30	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C31	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C32	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C33	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C34	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C35	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C36	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C37	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C38	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C39	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C40	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C41	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C42	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C43	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C44	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C45	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C46	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C47	53 32 04 8101	100 pF		Ceramic	500 V	20 %	ERIE	
C48	53 32 04 8471	470 pF		Ceramic	500 V	20 %	ERIE	
C49	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	
C50	52 12 04 1050	1 μF	Electrolytic	Dry Tantalum	35 V	20 %	Sprague	

Reference	Kudelski part Number	Designation				Manufacturer	Observation
N28	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N29	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N29	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N30	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N30	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N31	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N31	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
N32	50 01 00 3000	Silicon	NPN	DW6081	Factory Selected	(Replaceable by 2N2484)	SGS-Fairchild
N32	50 09 00 3000	Silicon	NPN	ES8063	Factory Selected	(Replaceable by 2N2484)	Motorola
P1	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P1	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
P2	50 01 00 2000	Silicon	PNP	IW9626	Factory Selected	(Replaceable by 2N3962)	SGS-Fairchild
P2	50 09 00 2000	Silicon	PNP	ES6303	Factory Selected	(Replaceable by 2N3962)	Motorola
CRYSTALS							
Xtal	58 41 93 0722	Crystal		307200 Hz			Ebauches S.A
Xtal	58 43 93 0722	Crystal		307200 Hz			Bliley
Xtal	58 43 73 0722	Crystal		307200 Hz			L.P.E.



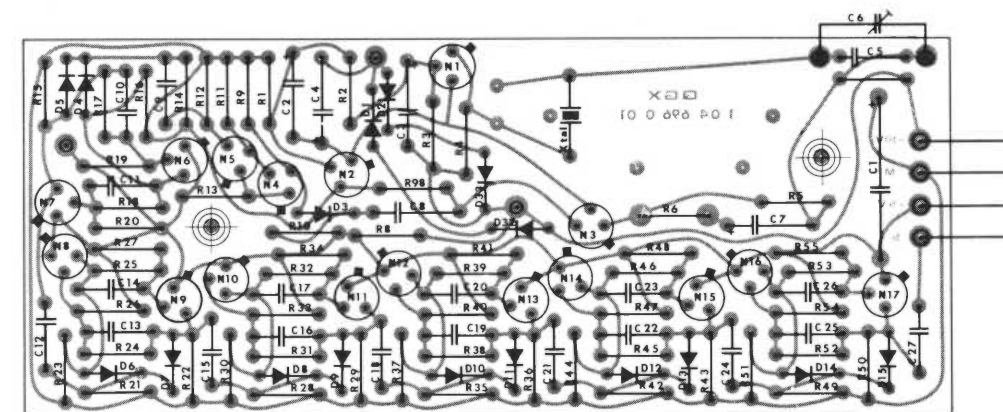
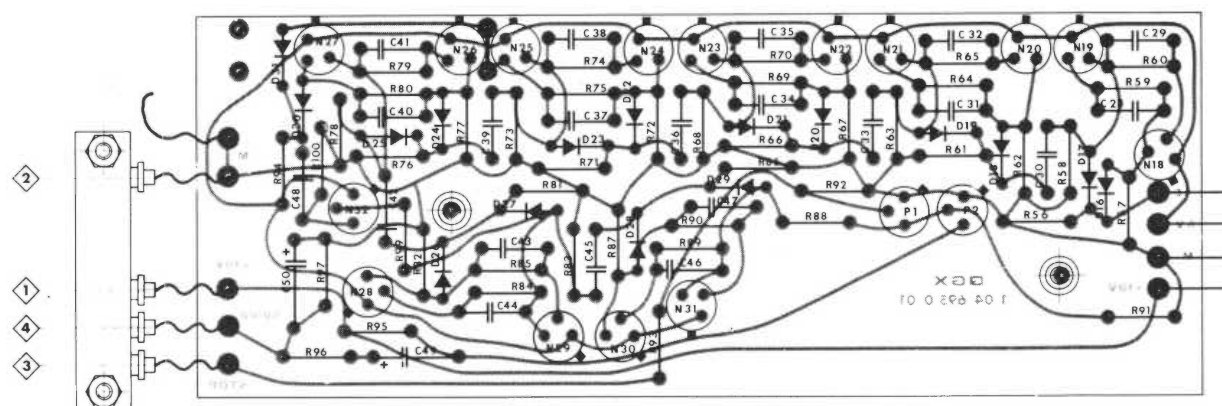
MODIFICATION FOR
CRYSTAL EBAUCHES S.A.
R5 = 2.7K
R6 = 330Ω
R7 = 100Ω

ALL DIODES TYPE 1X 8671
OR 1N 4168

UNLESS SPECIFIED

ALL RESISTORS ALLEN-BRADLEY 1/4W ±10%

ALL CAPACITORS ±20%



Modification:	Valid from ser. No:	CUDELSKI - Dept. NAGRA - CHESEAUX CH 1033 - Switzerland - Telex 24 392
Date: 10 30 70	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC. 19 West 44th Street - New York N.Y. 10036 Phone: (212) 661-8066
CIRCUIT DIAGRAM:		
QGX CRYSTAL PILOT GENERATOR		
Copy:	CUDELSKI	09 04 694 0 01

E6.4

Accessories for the Nagra IV

5.1. Cables, Carrying Cases, Packing

Code		Weight
Cables		
QCP	Spare cable Pilot-ATN	0.120 (4.3 oz)
QCE	Synchronization cable 10 m. (33 ft.) for Eclair camera	0.400 (14 oz)
QCX	Synchronization cable 10 m. (33 ft.) for Arriflex camera	0.400 (14 oz)
QCF	Synchronization cable 10 m. (33 ft.) for Bolex camera	0.400 (14 oz)
QCO	Connecting cable for use of SLO on synchronization during play-back to camera equipped with Pilot generator	0.100 (3.5 oz)
QCA	Start-Stop cable for remote control	0.100 (3.5 oz)
QCZ	Adapting cable allowing the use of all Nagra III synchronizing cables on the Nagra IV	0.020 (0.7 oz)
CS	Shielded cable 3 m. (10 ft.) with 2 conductors + ground (radio, amplifiers etc).	0.250 (8.8 oz)
Carrying Case		
QHT	Eveready case in black leather	0.700 (1 lb 9 oz)
QHTP	similar to QHT with "kangaroo" pocket	0.800 (1 lb 12 oz)
QHP	Spare handle	0.200 (7 oz)
QHC	Spare strap	0.150 (5.3 oz)
Packing		
QJT	Special packing in expanded polystyrene essential for dispatch of the Nagra	0.170 (6 oz)
JT	Special packing for accessories type SLO, DH, WFM	0.550 (1 lb 4 oz)

5.2. Power Supply Accessories

ATN	Mains Power Supply for the Nagra (110-250 V 50 or 60 Hz). Also gives a 1 V signal at mains frequency for pilot purposes when working with a camera with synchronous motor fed from the same mains power supply Dimensions: 160×62×45 mm (6.4"×2.5"×1.8")	1.050 (2 lb 5 oz)
PD	Set of 12 standard batteries (international type R 20)	1.000 (2 lb 3 oz)
CH	Spare cable DH (DHA) to Nagra IV	0.050 (1.8 oz)
PA	Set of 12 rechargeable accumulators (international type R 20)	1.600 (3 lb 9 oz)
PAR	Charger for accumulators type PA. This is placed between the ATN and the Nagra and requires no handling of the accumulators. The current is	

Code

stabilized at 250 mA $\pm$ 10 %. Charging time 14 hours approx.
Dimensions: 80×35×35 mm
(3.2"×1.4"×1.4")

Weight

0.250
(8.8 oz)

5.3. Sound Accessories

BM	Mixer with 3 direct and asymmetric inputs for dynamic microphones and one line input for a fourth microphone fed via an AMQ, AMS or a BS. The two microphone inputs of the Nagra remain usable for supplementary microphones. The signal/noise ratio of the BM is slightly inferior to the microphone input of the Nagra. The use of this accessory close to transmitters or other sources of powerful interference is not recommended. Dimensions: 250×130×60 mm (10"×5.1"×2.3")	1.100 (2 lb 7 oz)
BMT	Mixer identical to the BM but with symmetrical transformer inputs for dynamic microphones (50 or 200 Ω). This accessory is not sensitive to interference signals	1.200 (2 lb 11 oz)
QCB	BM (BMT) adaptor to Nagra IV	0.080 (2.8 oz)
BS	Dynamic microphone preamplifier (50 or 200 Ω) to be connected to the accessory input of the Nagra. The BS allows the use of a supplementary microphone without using a mixer. Dimensions: 80×35×28 mm (3.2"×1.4"×1.1")	0.400 (14 oz)
DH	Power amplifier (class B, 6 W) with built-in loudspeaker. It is powered by a set of 12 batteries. The DH gives a clear and powerful sound whose quality is good in taking into consideration the technique used, the weight and the dimensions of this accessory. Dimensions: 318×222×112 mm (12.5"×8.8"×4.4")	2.650 (5 lb 14 oz)
DHA	Power amplifier identical to the DH but with a socket for connecting to the ATN	2.700 (6 lb)

5.4. Synchronization Accessories

SLO	Synchronizer modifying automatically the speed of the Nagra IV (model L or derived models) during playback of a tape carrying a Pilot signal for synchronization with the mains. It can thus be used for the transfer of a recording on to a perforated magnetic film. Power supply, AC mains (110 to 250 V 50 or 60 Hz). Monitoring by cathode ray tube. Device for translating an inter-	
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Code		Weight
	ruption of Pilot signal into a 1 kHz signal (start mark). Dimensions: 325 × 262 × 115 mm (12.8" × 10.4" × 4.6")	4.750 (10 lb 7 oz)
SLQ-50	Quartz Crystal Controlled Generator as reference signal for the SLO. This accessory is a plug-in circuit within the SLO.	
SLQ-60	As for SLQ-50 but adjusted for 60 Hz.	
QCL	Adaptor SLO to Nagra IV	0.100 (3.5 oz)
QSV	Speed Varier, Performance (at all speeds) ±11 %. Dimensions: 143 × 63 × 40 mm (5.7" × 2.5" × 1.6")	0.450 (1 lb)
QSCC	Frequency Divider. Gives a pilot signal of 50 or 60 Hz to the Nagra from a camera motor with a pilot output of 100 or 120 Hz. Input: 0.5-5 V; 80-130 Hz. Output: 1 V at input frequency divided by 2. Dimensions: 145 × 65 × 22 mm (5.7" × 2.5" × 0.87")	0.250 (8.8 oz)
QPC	Photo-electric Coupler filtering the pilot signal from a "multi-duty" motor (e.g. Mitchell cameras). Pilot input: 90 to 250 V AC. Pilot output to Nagra: 1 V Dimensions: 40 mm ø, length 235 mm (1.6" ø, length 9.3")	0.300 (10.5 oz)
QRRT	Transmitter / Receiver System for the radio transmission of Camera Start Mark and Take Identification signals. It permits synchronous sound filming without any physical connection between the camera(s) and the Nagra Recorder. It comprises: A transmitter which is connected to the camera and can be operated from any 12 volt D.C. camera supply. Frequency: 40.680 MHz, crystal controlled. Output Power: 50 mW approx. Modulation 2 tone amplitude. Consumption: 2.5 mA quiescent 30 mA approx. during transmission. Dimensions: 113 × 100 × 35 mm (4.5" × 4" × 1.4") A receiver which is incorporated within the Nagra IV L and which can be used with several cameras (up to 9) on condition that each camera has its own transmitter. Construction: Integrated Circuits Local Oscillator: Crystal Controlled Intermediate Frequency: 450 kHz Automatic Gain Control: 90 db Power: 10 V ±2 V, chassis positive Consumption: 12 mA Dimensions: 138 × 57 × 15 mm (5.5" × 2.3" × 0.6")	0.350 (12.3 oz)

5.5. Measuring Instruments

WFMN	Wow and Flutter Meter. Useful for maintenance workshop. Measuring frequency 1000 Hz (the choice of this frequency allows the errors due to modulation interference to be reduced). Dimensions: 172 × 172 × 267 mm (6.8" × 6.8" × 10.5)	4.250 (9 lb 6 oz)
WFMS	Wow and Flutter Meter. As above except measuring frequency 3150 Hz (standardized according to DIN 45 507)	4.250 (9 lb 6 oz)

5.6. Microphones

Condenser microphones

These are the best microphones that can be recommended. By their very principle, their frequency response is flat and they do not accentuate either the bass frequencies or the high frequencies. In addition, because of the absence of resonance they permit a faultless production of transient noises. On the other hand, their price is high, they demand a power supply and they are less robust than dynamic microphones. In general, and above all in tropical countries, they must be protected against humidity. Taking into account the above restrictions, they are to be recommended for all recordings demanding an optimum quality.

Manufacturer Neumann

Neumann microphone KM 64. Cardioid characteristic. The directional characteristic is almost independent of frequency. The frequency response is equally good for sounds coming from the side.

Dimensions:

21 mm ø, length 112 mm (0.85" ø, length 4.4")

0.095
(3.4 oz)

Neumann microphone KM 63. Spherical characteristic (omnidirectional). It is less sensitive to wind and contact noise than the cardioid microphones. It can also be used as a "Lavalier" microphone of very high quality.

Dimensions:

21 mm ø, length 120 mm (0.85" ø, length 4.8")

0.095
(3.4 oz)

Neumann microphone KM 56. Adjustable characteristics, omnidirectional, cardioid, bidirectional. Allows adaptation to different acoustical conditions.

Dimensions:

21 mm ø, length 112 mm (0.85" ø, length 4.4")

0.095
(3.4 oz)

Transistorized Neumann microphone KM 73. Omnidirectional characteristic.

Dimensions:

21 + 24 mm ø, length 145 mm (0.85" + 0.95" ø, length 5.7")

0.095
(3.4 oz)

Transistorized Neumann microphone KM 74. Cardioid characteristic. The directional characteristic is almost independent of frequency.

Dimensions:

21 + 24 mm ø, length 145 mm (0.85" + 0.95" ø, length 5.7")

0.095
(3.4 oz)

Transistorized Neumann microphone KM 76. Omnidirectional cardioid and bidirectional switchable characteristics.

Dimensions:

21 + 46 mm ø, length 175 mm (0.85" + 1.85" ø, length 6.9")

0.200
(7 oz)

Special Accessories for Neumann Microphones

Power supply for condenser microphones types KM 56, 63, 64. Gives the power supply necessary for this type of microphone from the Nagra.

Dimensions:

142 × 62 × 25 mm (5.6" × 2.5" × 1")

0.350
(12.3 oz)

Code		Weight	Code		Weight
VN	Windshield Neumann WS 21	0.020 (0.7 oz)		Dimensions: 40 mm $\varnothing$, length 156 mm (1.6" $\varnothing$, length 6.2")	0.170 (6 oz)
GN	Elastic suspension Neumann EA 21 for fixing on boom or stand	0.150 (5.3 oz)	VA 24	Windshield type W 24 for micro- phone D-24 B	0.350 (12.3 oz)
CN	Extension cable 10 m. (33 ft.) AMC to microphone N.B. Microphones KM 73, 74, 76 can only be used with plug-in preampli- fier type QPM-3.5 in the Nagra IV.	0.450 (1 lb)	GA 1	AKG ST. 1 Table Stand	0.100 (3.5 oz)
			GA 24	Shock-Absorber AKG H 24	0.150 (5.3 oz)
			MA 202	AKG microphone type D 202 CS. Cardioid, excellent two way system. Bass attenuation adjustable from 0 to 20 db. Sensitivity: 0.20 mV/ μ bar Dimensions: 30 mm $\varnothing$, length 212 mm (1.2" $\varnothing$, length 8.4")	0.300 (10.5 oz)
	Manufacturer Sennheiser				
KS 104	Sennheiser transistorized micro- phone type MKH 104. Omnidirec- tional characteristic. Extended flat frequency response. Dimensions: 20 mm $\varnothing$, length 126 mm (0.8" $\varnothing$, length 5")	0.100 (3.5 oz)			
KS 105	As for above but with symmetrical output.	0.100 (3.5 oz)	MB 67	Manufacturer Beyer Beyer microphone M 67 Cardioid. For reporting, singers and music. The internal system is suspended to eliminate contact noise from the fingers and to protect against shock. Sensitivity: 0.22 mV/ μ bar Dimensions: 38 mm $\varnothing$, length 200 mm (1.5" $\varnothing$, length 8")	0.300 (10.5 oz)
KS 404	Sennheiser transistorized micro- phone type MKH 404. Cardioid char- acteristic, with excellent frequency response. Very precise directional character- istic, independent of frequency. Dimensions: 20 mm $\varnothing$, length 126 mm (0.8" $\varnothing$, length 5")	0.100 (3.5 oz)	GB 27	Table stand Beyer ST 260/27 for M 67 microphone	0.050 (1.8 oz)
KS 405	Similar to MKH 404 but with sym- metrical output	(3.5 oz)	VB 85	Windshield Beyer WS 85 for M 67 microphone	0.300 (10.5 oz)
GS 105	Shock-Absorber type MZS 105 for microphones MKH 104, 105, 404 and 405	0.100 (3.5 oz)	MB 69	Beyer microphone M 69. Cardioid characteristics for theatre and orchestra (in studio). Sensitivity: 0.24 mV/ μ bar Dimensions: 24 mm $\varnothing$, length 170 mm (0.95" $\varnothing$, length 6.7")	0.250 (8.8 oz)
VS 201	Windshield type MZW 201 for micro- phones MKH 104, 105, 404 and 405	0.020 (0.7 oz)		Table stand Beyer ST 260/24 for microphone M 69	0.050 (1.8 oz)
KS 804	Sennheiser transistorized micro- phone MKH 804. New type of micro- phone giving extremely directional characteristics independent of fre- quency. Ideal for television and cinema. Dimensions: 19 mm $\varnothing$, length 550 mm (0.75" $\varnothing$, length 21.6")	0.350 (12.3 oz)	GB 24	Windshield Beyer WS 69 for micro- phones M 69 or M 88	0.020 (0.7 oz)
KS 805	Similar to MKH 804 but with sym- metrical output	0.350 (12.3 oz)	MB 88	Beyer microphone M 88 (or M 66). Cardioid for high fidelity recording. Sensitivity: 0.28 mV/ μ bar Dimensions: 24 mm $\varnothing$, length 165 mm (0.95" $\varnothing$, length 6.5")	0.220 (7.8 oz)
GS 805	Shock-Absorber type MZS 805 for microphones MKH 804 and 805	0.800 (1 lb 12 oz)		Same accessories as for M 69.	
VS 804	Windshield type MZW 804 for micro- phones MKH 804 and 805. Note: This windshield can only be used with the Shock-absorber GS 805 (MZS 805)	1.000 (2 lb 3 oz)	MB 100	Beyer microphone M 100. Omni- directional. For high fidelity record- ing, reduced dimensions, low sensi- tivity. This microphone is useful for recording music in good acoustical conditions, when it is not necessary to use a cardioid microphone to reduce undesirable sounds. Sensitivity: 0.1 mV/ μ bar Dimensions: 22 mm $\varnothing$, length 120 mm (0.87" $\varnothing$, length 4.8")	0.120 (4.3 oz)
AMS	Adaptor for Sennheiser micro- phones types MKH 104, 404, 804. Plugs into accessory socket of Nagra. Allows optimum work with these types of microphones. Dimensions: 80 $\times$ 35 $\times$ 28 mm (3.2" $\times$ 1.4" $\times$ 1.1")	0.250 (8.8 oz)	GB 22	Table stand Beyer ST 260/22 for microphones M 100 and M 160	0.100 (3.5 oz)
CK	Extension cable 10 m (33 ft.) AMS to microphone	0.450 (1 lb)	MB 110	Beyer microphone M 110 "Lavalier" Omnidirectional. Very good profes- sional characteristics. Sensitivity: 0.1 mV/ μ bar Dimensions: 28 mm $\varnothing$, length 60 mm (1.1" $\varnothing$, length 2.4")	0.150 (5.3 oz)

Dynamic Microphones

	Manufacturer AKG
MA 24	AKG microphone D-24. Cardioid characteristic. Excellent quality. Fit- ted with device for cutting low fre- quencies for speech. The compen- sation apertures render this micro- phone sensitive to wind noise. Sensitivity: 0.18 mV/ μ bar

MB 160	Beyer microphone M 160 profes- sional class double ribbon. Super cardioid characteristic for high qual- ity recording in studios, churches and concert halls. Sensitivity: 0.1 mV/ μ bar
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Code		Weight
	Dimensions: 38 mm $\varnothing$, length 154 mm (1.5" $\varnothing$, length 6.1")	0.150 (5.3 oz)
VB 260	Windshield Beyer type WS 260 for microphone M 160	0.200 (0.7 oz)
Manufacturer Sennheiser		
MS 21	Sennheiser microphone MD 21 N. Omnidirectional characteristic. Very robust. This microphone is very convenient for reporting. Sensitivity: 0.2 mV/ μ bar Dimensions: 46 $\times$ 46 $\times$ 120 mm (1.8" $\times$ 1.8" $\times$ 4.8")	0.300 (10.5 oz)
GS 21	Table stand Sennheiser MZT 21 for microphone MD 21	0.200 (7 oz)
VS 22	Windshield Sennheiser MZW 22 for microphones MD 21 and MD 421. Manufactured in polyester resin reinforced with glass fibre	0.150 (5.3 oz)
MS 421	Sennheiser studio microphone MD 421 N. Cardioid characteristic. Dimensions: 177 $\times$ 48 $\times$ 46 mm (7" $\times$ 1.9" $\times$ 1.8")	0.300 (10.5 oz)
VS 421	Windshield Sennheiser MZW 421 in foam for microphones type MD 21 and MD 421 N	0.020 (0.7 oz)
General Accessories		
GB 211	Beyer Boom arm Sch 211	1.000 (2 lb 3 oz)
GB 11	Beyer swan neck type SH 11/200 N	0.150 (5.3 oz)
GB 200	Beyer base type ST 200 for fixing SH 11/200 N on to a table	0.650 (1 lb 7 oz)
GB 6	Beyer clamp type MKV 6 for all microphones	0.050 (1.8 oz)
GA 200	AKG stand type ST 200 with anti-vibration device for all microphones	4.200 (9 lb 4 oz)
GA 201	AKG stand type ST 201 telescopic for all microphones Dimensions: 1500 mm long (4 ft. 11")	1.250 (2 lb 12 oz)
Cables for dynamic microphones		
CR	Cable equipped with Tuchel plug T 3261/1 and Cannon female, length 1.5 m (4 ft. 11")	0.150 (5.3 oz)
CD	Cable equipped with Tuchel plug T 3261/1 and Cannon female, length: 10 m (33 ft.)	0.400 (14 oz)
QCR	Cable with Tuchel plug T 3261/1 and Cannon male for Nagra Standard NAB. Length: 1.5 m (4 ft. 11")	0.400 (14 oz)
QCD	Cable with Tuchel plug T 3261/1 and Cannon male for Nagra Standard NAB. Length: 10 m (33 ft.)	0.400 (14 oz)

5.7. Headphones

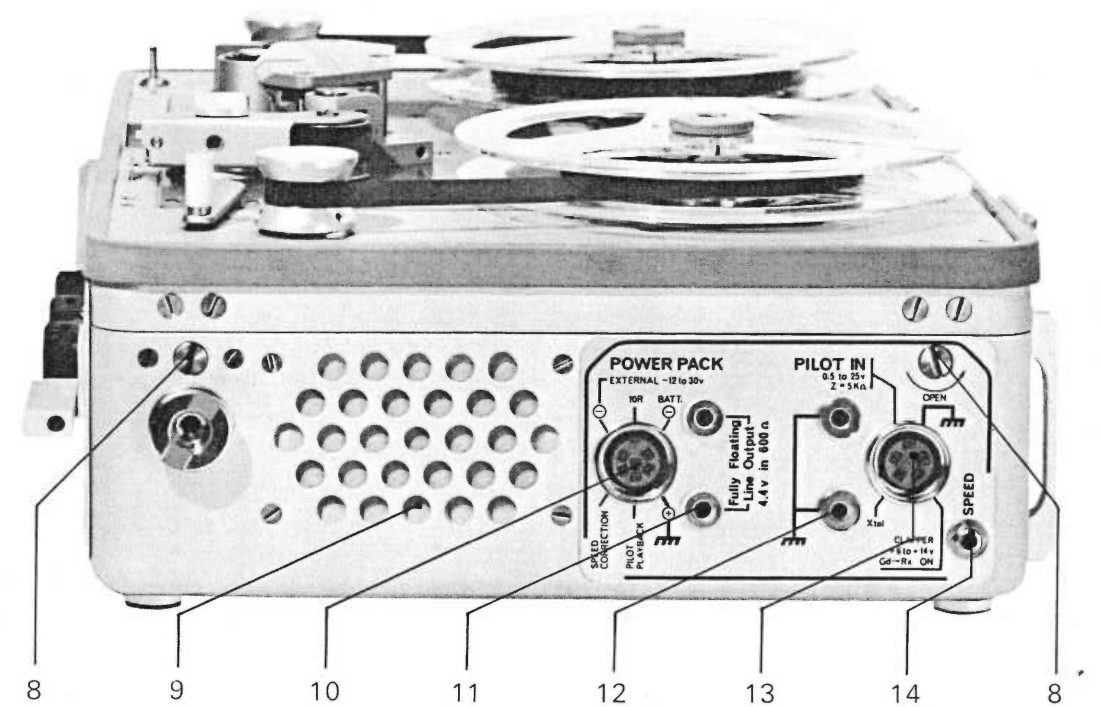
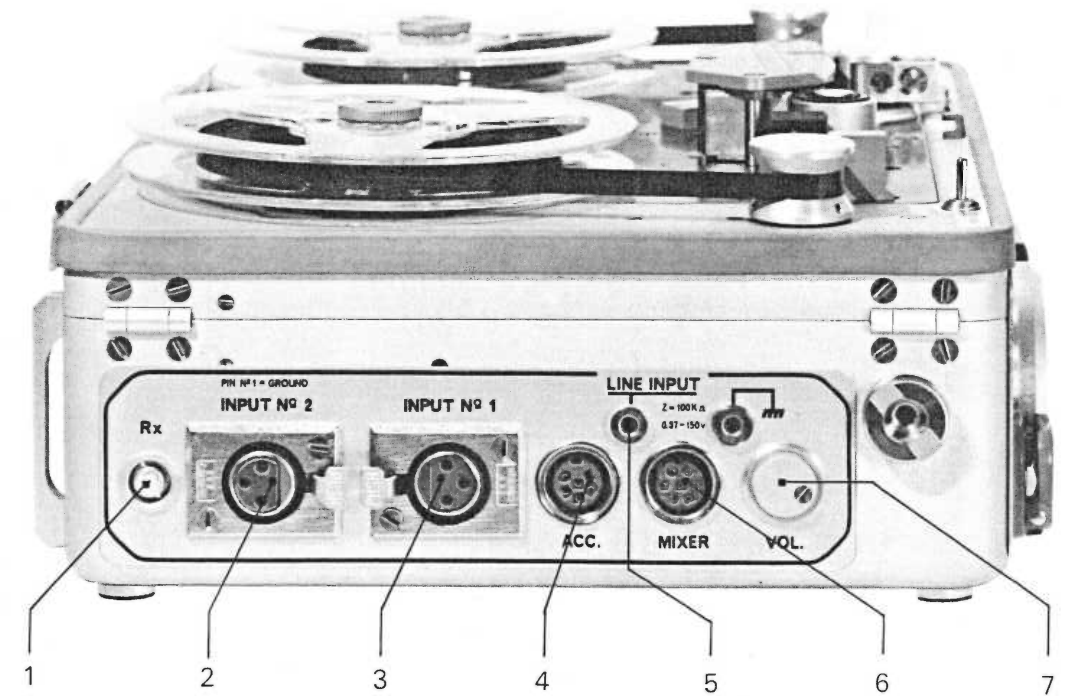
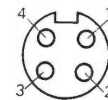
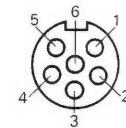
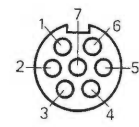
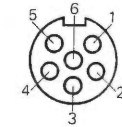
The use of headphones is strongly recommended. The following models allow high quality monitoring comparable with that of a studio loudspeaker. The Nagra IV allows monitoring during recording so that any possible defect can be immediately discerned.

QEB 48	Beyer headphones type DT 48. For professional use par excellence.	0.600 (1 lb 5 oz)
QEB 48 S	Beyer headphones type DT 48 S. New version of the DT 48. Large ear pads stop all sounds from the outside.	0.750 (1 lb 10 oz)
QEB 96	Beyer headphones type 96. Standard model, light, comfortable. Equipped with ear pads.	0.500 (1 lb 2 oz)
QEB 509	Beyer headphones type 509. Stethoscope type	0.150 (5.3 oz)
QEA	AKG headphones type K 50. Standard model, light comfortable	0.500 (1 lb 2 oz)
Headphone Accessories		
EBP 48	Ear pads for headphones type DT 48	0.050 (1.8 oz)
EBE 48	Ear cups for headphones type DT 48	0.050 (1.8 oz)
EBP 96	Ear pads for headphones type DT 96	0.050 (1.8 oz)
EBE 96	Ear cups for headphones type DT 96	0.050 (1.8 oz)
EBP 509	Ear plugs for headphones type DT 509	0.050 (1.8 oz)

5.8. Tapes

TA 102-175	Scotch tape 175 for optimum performance of Nagra — 5" reels — (15 mins)	0.200 (7 oz)
TB 102-175	As above — 7" reels — (30 mins)	0.400 (14 oz)
TE 150-215	Scotch tape 215 for ordinary recording — 5" reels (22 mins)	0.200 (7 oz)
TG 150-215	As above — 7" reels — (44 mins)	0.400 (14 oz)
TH 200-220	Scotch tape 220 extra thin-5" reels (30 mins)	0.200 (7 oz)
TK 200-220	As above — 6" reels — (42 mins)	0.300 (10.5 oz)
TL 200-220	As above — 7" reels — (60 mins)	0.365 (13 oz)
TY	Empty tape reel — 5"	0.050 (1.8 oz)
TZ	Empty tape reel — 7"	0.100 (3.5 oz)
TW	Scotch splicing tape $\frac{1}{2}$ " $\times$ 4 m (13 ft.)	0.050 (1.8 oz)
TT	Antimagnetic scissors	0.050 (1.8 oz)
TX	Leader tape $\frac{1}{4}$ " $\times$ 15 m (50 ft.)	0.020 (0.7 oz)

- 1 - Antenna Socket for Receiver
- Prise antenne pour récepteur
- Empfängerantennendose
- 2 - Mike Input no. 2
- Entrée micro no. 2
- Mikrophoneingang no. 2
- 3 - Mike Input no. 1
- Entrée micro no. 1
- Mikrophoneingang no. 1
- 4 - Accessory Socket
- Prise accessoire
- Zubehördose
- 5 - Line Input
- Entrée ligne
- Linieneingang
- 6 - Mixer Socket
- Prise Mixer
- Mixerdose
- 7 - Loudspeaker Volume
- Volume haut-parleur
- Lautsprecherstärke
- 8 - Box Fastener
- Fermeture boîtier
- Gehäuseverschluss
- 9 - Loudspeaker
- Haut-parleur
- Lautsprecher
- 10 - Power Supply Input and Pilot Output
- Prise d'alimentation et sortie pilote
- Speisedose und Pilotausgang
- 11 - Line Output
- Sortie ligne
- Linienausgang
- 12 - Ground Sockets
- Prises de masse
- Erdanschluss
- 13 - Pilot and Clapper Inputs
- Entrées pilote et claquette
- Pilot- und Startmarkierungseingänge
- 14 - Speed Varier Jack
- Prise pour variateur de vitesse
- Geschwindigkeitsreglerdose



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Tel: (0240-3) 5511
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Brussels 5
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Telex: 21359

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