

POWER SUPPLY

The QGB can be supplied from the internal batteries of the NAGRA. Its consumption, added to that of the recorder is slightly too high for ordinary batteries. We recommend the use of rechargeable or large capacity batteries (alkaline cells). The NAGRA-QGB assembly can also be fed by an ATN-3 mains power supply which is to be connected to the rear socket of the QGB. In order to avoid any unnecessary battery drain, the QGB is equipped with an Automatic Stand-By switch. In OFF position, the QGB is continually operative, whether the tape is transported or not. This is the position normally used with the mains power pack. In ON position, the QGB is set to stand-by mode, with the holding brakes locked, whenever the tape stops. Power consumption is then very low. However, the action of the holding brakes at the time of each start and stop of the tape produces a slight click.

ALIMENTATION

Le QGB peut être alimenté par les batteries internes du NAGRA. Sa consommation, ajoutée à celle de l'enregistreur se révèle un peu trop forte pour des piles ordinaires. Nous recommandons l'emploi d'accumulateurs ou de piles de grande capacité (alcalines). L'ensemble QGB-NAGRA peut être alimenté extérieurement par un ATN-3 se raccordant à la prise arrière du QGB. Pour éviter toute consommation superflue, le QGB comporte un commutateur « Automatic Stand-By ». En position OFF le QGB est toujours en fonction, que la bande défile ou non. C'est la position normalement utilisée avec l'alimentation secteur. Sur ON, le QGB se met en attente, freins de parc serrés, dès que la bande s'arrête. Sa consommation est alors très réduite; cependant l'action des freins de parc est accompagnée d'un léger claquement lors de chaque arrêt et départ de la bande.

SPEISUNG

Das QGB kann durch die im NAGRA eingebauten Batterien gespeist werden. Sein Verbrauch zusammen mit dem des Tonbandgerätes hat sich jedoch für normale Batterien als etwas zu gross herausgestellt. Wir empfehlen daher die Verwendung von Akkus oder Hochleistungs-Batterien (Alkali-Zellen). Das QGB kann zusammen mit dem NAGRA-Gerät als eine Einheit extern gespeist werden, z.B. durch ein ATN-3-Speisegerät, wobei die Speiseleitung an die hintere Steckbuchse des QGB angeschlossen wird. Um unnötigen Stromverbrauch zu vermeiden, ist auf dem QGB ein Funktions-Wahlschalter (Autom. Stand-By) vorgesehen. In OFF-Stellung ist das Gerät in voller Funktion, ob das Band läuft oder nicht. Dies ist die Normalstellung bei Verwendung eines externen Speisegerätes. In ON-Stellung geht das QGB nach Bandstillstand auf Stand-by Stellung, mit angezogenen Bremsen. Dabei ist der Stromverbrauch sehr gering. In dieser Funktions-Stellung bewirkt jedoch die Bremsbetätigung bei jedem Anlauf und Anhalt ein leichtes Schlaggeräusch.

SPECIFICATIONS*(Typical values)***CARACTÉRISTIQUES***(Valeurs typiques)***TECHNISCHE DATEN***(Typische Werte)*

Dimensions, <i>Abmessungen</i>	435 x 96 x 110 mm (17-1/8 x 3-7/8 x 4-3/8")
Operating temp., <i>temp. de fonctionnement, zulässige Betriebstemp.</i>	0 - 70° C (32 - 158° F)
Weight, <i>poids, Gewicht</i>	3 kg (6 lbs)
Rewinding time, <i>temps de reboinage, Rückspulzeit</i>	
(ATN-3, 10 1/2" reels, <i>bobines 26,5 cm, 26,5 cm Spulen 2400', 730 m</i>)	
Full reel, <i>bobine pleine, Vollspule</i>	2 min.
Half reel, <i>demi-bobine, halbe Spule</i>	1 min.
Power supplied by fully charged accumulators in NAGRA: rewinding times multiplied by 2.5	
<i>Avec accus chargés dans NAGRA: temps de reboinage multipliés par 2,5</i>	
<i>Speisung durch vollgeladene Akkus im NAGRA: Rückspulzeiten 2,5 mal verlängert</i>	
Power consumption, <i>consommation, Stromverbrauch</i>	
Normal transport, <i>défilement normal, Normaler Bandlauf</i>	220 mA
Fast winding, <i>défilement rapide, Schnelllauf</i>	300 mA
Stand-by, <i>position d'attente, Bereitschaftsstellung</i>	5 mA
Stop (without tape), <i>arrêt (sans bande), Stop (ohne Band)</i>	1 mA
Running time with rechargeable cells installed in NAGRA,	
<i>Autonomie avec accumulateurs dans NAGRA, Laufdauer mit im NAGRA eingesetzten Akkus:</i>	
(Recording and rewinding, <i>enregistrement et reboinage, Aufnahme und Rückspulung</i>)	
4 Ah cells, <i>accumulateurs, Akkus</i>	8 h
2.5 Ah cells, <i>accumulateurs, Akkus</i>	5 h

ACCESSORIES**ACCESSOIRES****ZUBEHÖR**

TPBC	Cine type reel holder	Porte-bobine cine	Dreizackspulenträger
QGBA-2	AEG type hub holder	Porte-noyau AEG	AEG-Kernträger
QGBN	NAB type hub holder	Porte-noyau NAB	NAB-Kernträger

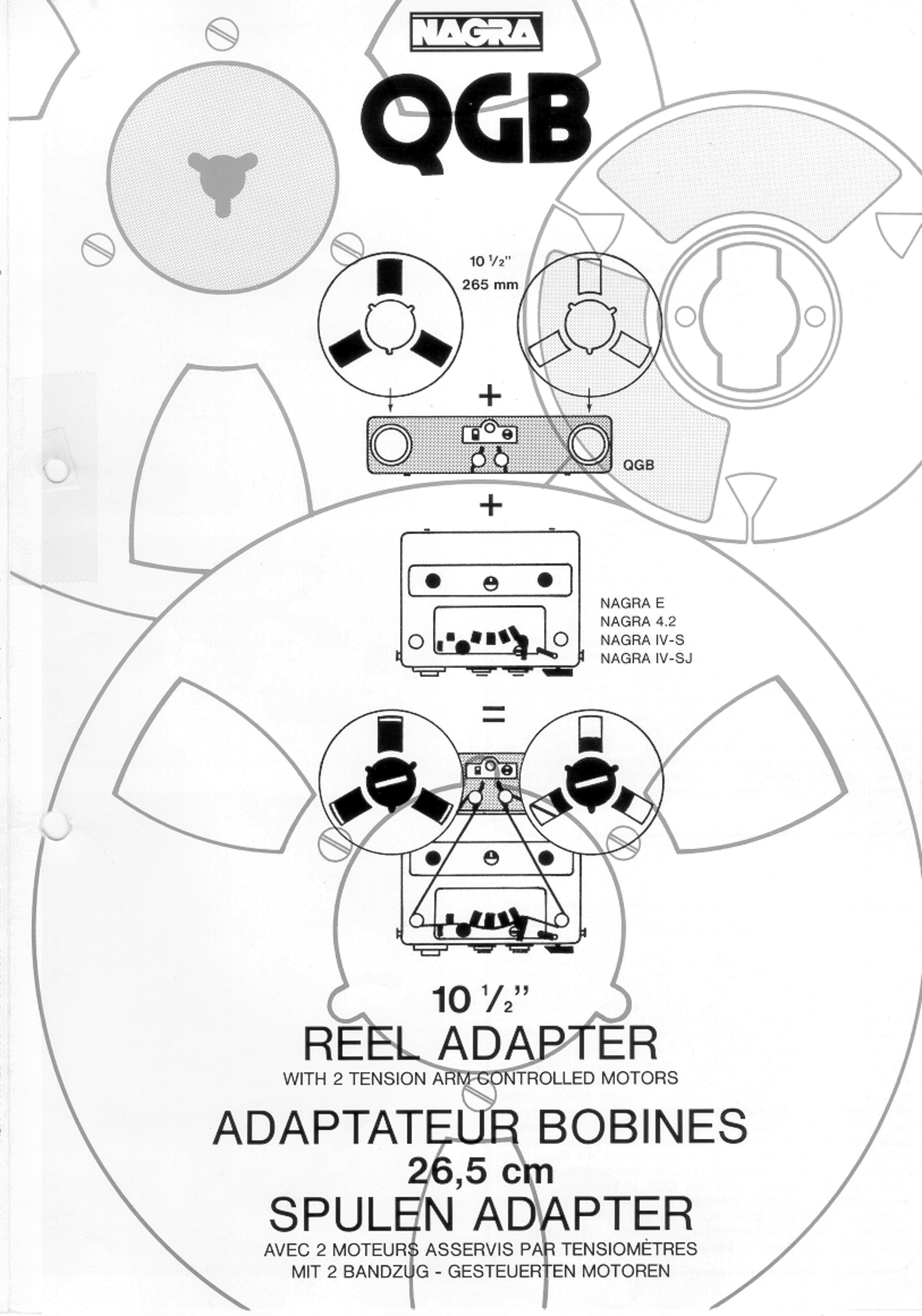


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NAGRA
QGB



10 1/2"
REEL ADAPTER

WITH 2 TENSION ARM-CONTROLLED MOTORS

ADAPTATEUR BOBINES

26,5 cm

SPULEN ADAPTER

AVEC 2 MOTEURS ASSERVIS PAR TENSIONNEMENTS
 MIT 2 BANDZUG - GESTEUERTEN MOTOREN

DESCRIPTION

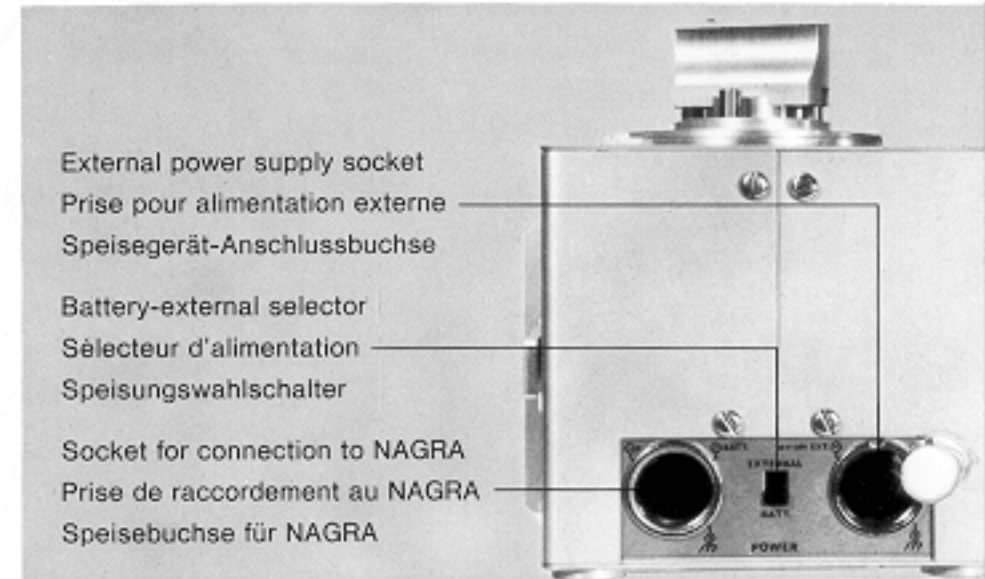
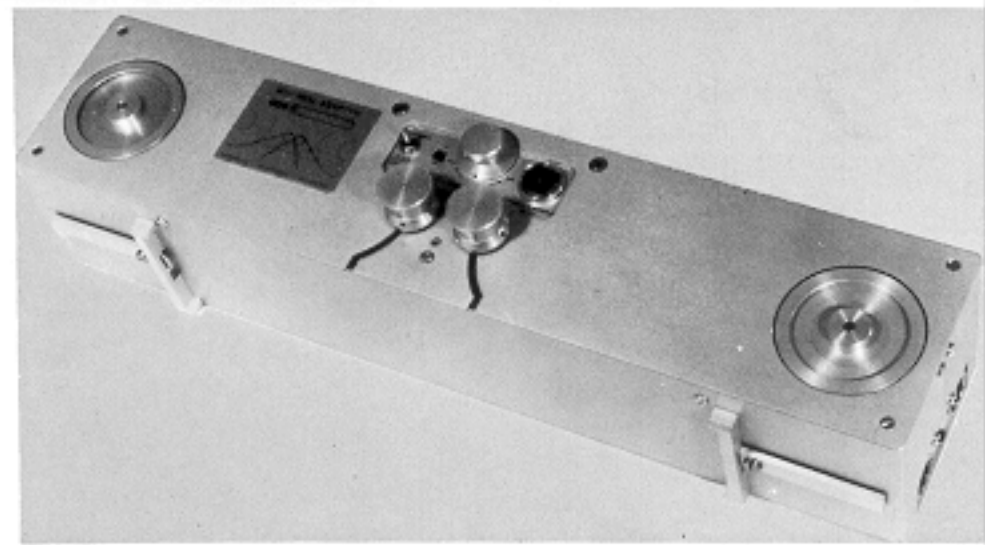
The QGB adapter is an accessory developed for NAGRA recorders model E, 4.2, IV-S and IV-SJ. It enables the use of 10 1/2" reels and flanges with NAB/AEG hubs and cine-type reel holders holding 2400' of 2 mil tape, i.e. one hour of recording at 7.5 ips. This very sophisticated unit is fully automatic. The QGB, ensures a very stable tape speed and fast winding. Smaller reels can also be used. The reel supports accept interchangeable adapters fitting all existing types of reels. These are coupled to the servo-motors controlled by the tensiometers, maintaining the tape tension within very narrow limits. As soon as the left tensiometer is moved, which happens when the NAGRA is set on, the QGB is activated, its brakes are released and the servo-motors start to rotate. If the tape stops for more than 1.5 sec, a checking device causes the QGB to return to stand-by state.

DESCRIPTION

L'adaptateur QGB est un accessoire destiné aux magnétophones NAGRA E, 4.2, IV-S et IV-SJ. Il permet le montage de bobines et plateaux de 266,7 mm à noyau NAB, AEG ou de bobines cinéma qui peuvent contenir 730 m de bande 50 µ. A la vitesse de 19 cm/sec., on obtient ainsi une heure d'enregistrement. Ce dispositif, très perfectionné, est d'un fonctionnement entièrement automatique. Le QGB assure un défilement rigoureux et permet des bobinages avant et arrière très rapides. Son utilisation est également intéressante avec de plus petites bobines. Ses porte-bobines reçoivent des moyeux interchangeables s'adaptant aux divers types de noyaux existants. Ceux-ci sont couplés à deux servo-moteurs contrôlés par leur tensiomètre qui maintiennent la tension de la bande dans des limites très étroites. Dès que le tensiomètre gauche se déplace, ce qui se produit quand le NAGRA est mis en défilement, le QGB entre en fonction, les freins de parc se desserrent et les servo-moteurs entrent en action. Un dispositif de contrôle vérifie si la bande défile réellement et s'il constate qu'elle est arrêtée pendant plus de 1,5 sec., il remet le QGB en attente.

ARBEITSWEISE

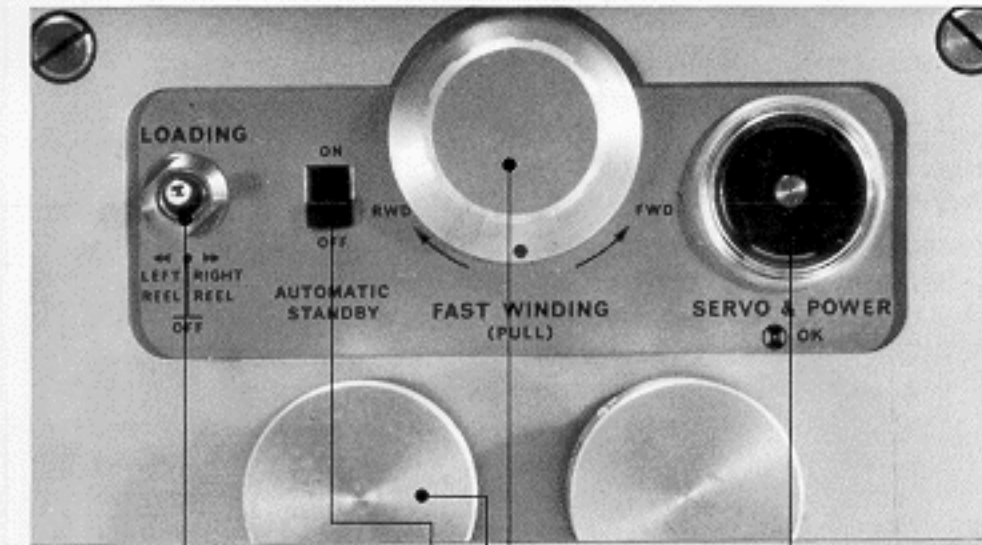
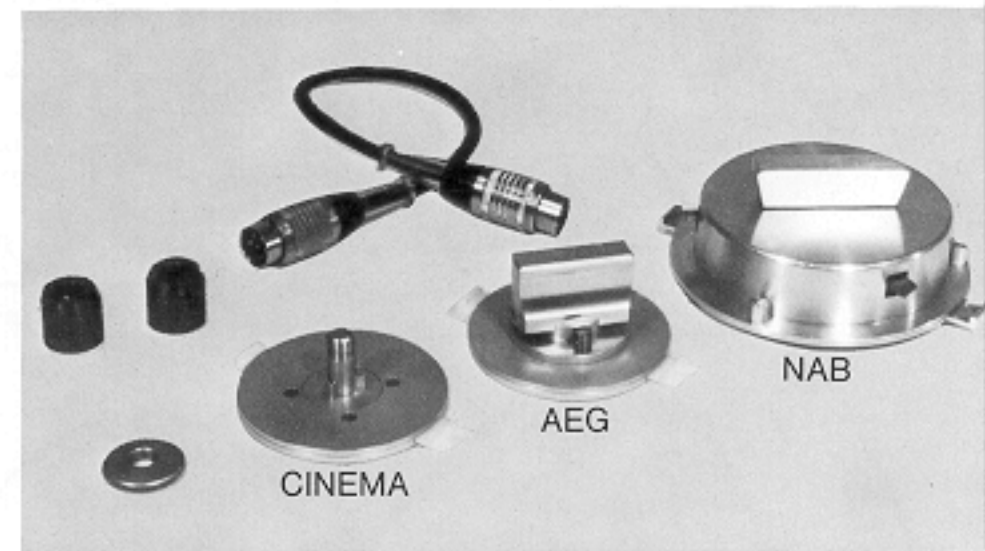
Der QGB Adapter ist ein Zusatzgerät für die NAGRA E, IV-S, IV-SJ und 4.2. Es erlaubt die Verwendung von AEG-, NAB- und Kinospulen von 266,7 m Durchmesser, die 730 m Dickfilmband (50 µm) aufzunehmen vermögen. Bei einer Bandgeschwindigkeit von 19 cm/s beträgt die Spieldauer 1 Stunde. Dieses hochperfektierte Gerät arbeitet völlig automatisch. Durch seine genaue Bandführung und die schnelle Vor- und Rückspulung ist das QGB auch zur Verwendung von kleineren Spulen sehr geeignet. Seine Spulenträger sind mit auswechselbaren Aufsätzen versehen, sodass Spulen verschiedener Kerntypen verwendet werden können. Der Antrieb erfolgt über zwei durch Bandzug-Sensoren geregelte Servomotoren, die den Bandzug in sehr engen Grenzen einhalten. Sobald das angeschlossene NAGRA-Gerät das Band zum Laufen bringt, wird der linke Bandzug-Sensor des QGB betätigt. Dadurch wird das QGB in Funktion gesetzt; seine Bremsen werden entriegelt und die Antriebsmotoren laufen an. Falls das Band nun während mehr als 1,5 Sek. stillsteht, sorgt ein Bandbewegungs-Detektor dafür, dass das QGB wieder auf Stand-by Stellung zurückschaltet.



External power supply socket
Prise pour alimentation externe
Speisegerät-Anschlussbuchse

Battery-external selector
Sélecteur d'alimentation
Speisungswahlschalter

Socket for connection to NAGRA
Prise de raccordement au NAGRA
Speisebuchse für NAGRA



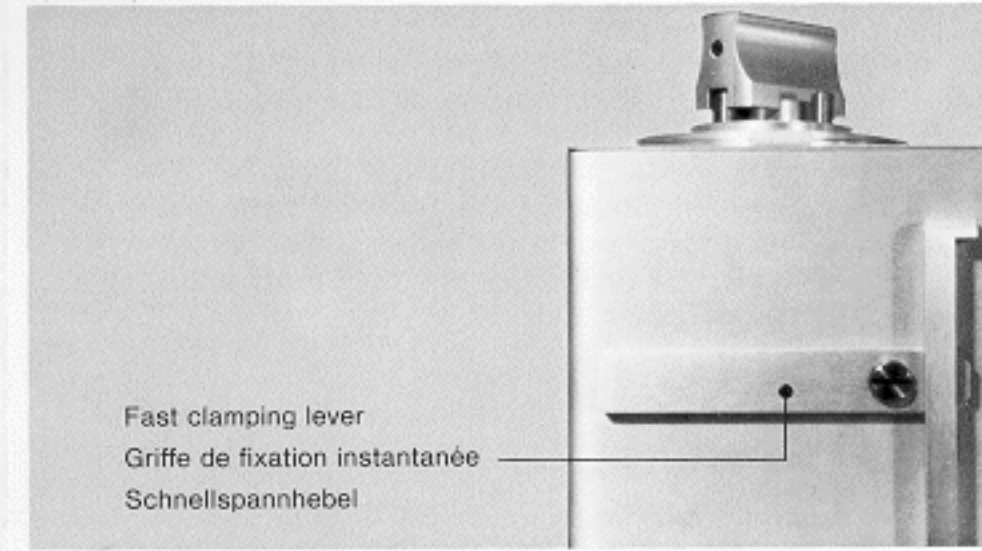
Loading switch:
facilitates tape threading.
Commutateur Loading:
facilite la mise en place
de la bande.
Loading-Schalter:
Erleichtert das Aufspulen.

Automatic stand-by switch
Commutateur automatic
stand-by
Automatischer Stand-by
Schalter

Electronic tensiometer
Tensiomètre électronique
Elektronischer Tensiometer

Rotating indicator: turns black in case of insufficient voltage, speed irregularities or faulty handling.
Voyant rotatif: avertit en cas de manque de tension, d'irrégularité de marche et d'erreur de manœuvre.
Dreh-Anzeiger: zeigt Minderspannung, Lauf-Unge nauigkeit und Bedienungsfehler an.

Fast winding: pull up and rotate to control winding speed.
Bobinage rapide: tirer, puis tourner pour régler la vitesse.
Schnellpulknopf: Ziehen, dann Geschwindigkeit einstellen.



Fast clamping lever
Griffe de fixation instantanée
Schnellspannhebel

OPERATION

The QGB installation is a simple operation made without tools. Place the unit against the back of the NAGRA, and tighten the clamps by bringing the levers in horizontal position. Connect the front socket of the QGB to the Power Pack socket of the NAGRA. That's all, the set is ready for operation. Install the reels and thread the tape. In order to avoid rotation of the empty reel when touching one of the tensiometers, a loading switch is provided to cut the power supply of the corresponding motor. This switch must be reset to neutral position, otherwise the tape would unwind when the NAGRA is activated. For fast winding, pull up the central button, and rotate it to control winding speed and direction. Use with flanges: The tape tension afforded on the QGB is much lower than that of studio machines. As a result, the tape will not be wound as tightly and the pancake will have to be handled with utmost care.

UTILISATION

L'installation du QGB est très simple et n'exige aucun outillage. Appuyer l'appareil contre les patins arrière du NAGRA et tendre les griffes en ramenant les leviers à l'horizontale. Raccorder la prise avant du QGB à la prise Power Pack du NAGRA. Le montage est terminé et le QGB est prêt à fonctionner. Mettre en place les bobines, puis la bande. Pour éviter que la bobine vide se mette à tourner dès qu'un tensiomètre est déplacé, un commutateur (Loading) permet de couper l'alimentation du moteur correspondant. Ce commutateur doit être remis en position de repos, sinon la bande se détendrait dès qu'on mettrait le NAGRA en défilement. Le bouton central, lorsqu'il est tiré, permet de régler progressivement le bobinage rapide dans un sens ou dans l'autre. Utilisation avec des plateaux: Les plateaux permettent le montage de bande en galette. Toutefois, sur le QGB, les tensions de bande sont inférieures à celles des machines de studio. La rigidité de la galette enroulée est donc moindre et il faudra la manier avec soin.

HANDHABUNG

Der Anschluss des QGB an das NAGRA-Gerät ist sehr einfach und erfordert keine Werkzeuge. Es wird einfach gegen die hinteren Kufen des NAGRA gestossen, wobei die Hebel waagrecht sein müssen. Dann wird die vordere Steckbuchse des QGB mit der «Power Pack»-Steckbuchse des NAGRA verbunden und das Gerät ist funktionsbereit. Die Spulen werden montiert und das Band eingelegt. Um zu vermeiden, dass beim Berühren eines Tensiometers die Leerspule zu laufen anfängt, ist ein Schalter (Loading) vorgesehen, mit dem man den entsprechenden Motor ausser Betrieb setzen kann. Dieser Schalter muss nach dem Einwickeln wieder in Ruhstellung gebracht werden, um zu vermeiden, dass das Band nach dem Anlaufen unaufgewickelt bleibt. Das Potentiometer in der Mitte regelt progressiv die Geschwindigkeit für schnellen Vor- und Rücklauf; es wird erst durch Ziehen am Knopf in Funktion gesetzt. Die Wickelteller erlauben das Aufwickeln von Bändern auf freitragende Kerne. Dennoch sollten derart gewickelte Bänder mit Sorgfalt gehandhabt werden, da der Bandzug des QGB kleiner ist als der von Studiomaschinen.

TEST AND ADJUSTMENT CHECK LIST FOR QGB

1. General checks

- 1.1 Tensiometer-holder circuit:
 - check that the plastic block-stops (under the tension arm pulleys) are well pressed in (distance: abt 1mm from the circuit).
- 1.2 Check the distance between the tensiometer lever and the pulley beneath : 6mm (use a shim).
- 1.3 Check that the tensiometers block-stop contacts touch the corresponding plates, about 1 mm before the mechanical block-stop.
- 1.4 Check that the tensiometer push-hub ball is correctly fixed on the threaded rod.
- 1.5 The fast tape-running switch must switch symmetrically, referring to the corresponding switch movement. The adjusting screw has to be assured with "Loctite".
- 1.6 Brakes : check the distance between the electromagnet poles and the armature : 0,3 - 0,4 mm.
- 1.7 Check the winding direction" cam sliding freedom.
- 1.8 Main circuit : check that the levers assuring the circuit rigidity does not touch the neighbouring tracks on the printed circuit board.

Check with an ohmmeter that no connection exists between the radiator and the collector of each power transistor. These transistors mounted on insulators coated with silicon grease.

2. Brake adjustment

- 2.1
 - Unplug the main circuit-
 - Connect a stabilized power supply to the brake release coil terminals.
 - Slowly increase the voltage until brake is released.
 - The brake release voltage $3\text{ V} \leq V_{\text{det}} \leq 4\text{ V}$
 - Correct the brake release voltage by adjusting the corresponding springs and push-nuts.
 - Spring length on both sides of the brake release must be equal.

- 2.2 Slowly decrease the stabilized power supply voltage till the brake operates.
At that moment, the voltage between the coil terminals must be lower than 1,5 V.
- 2.3 Place a tape-reel (if possible a large one) on the reelholder. Attach the end of the tape to a dynamometer. Pull so that the tape moves slowly (the stabilized power supply unplugged). Evaluate the brake torque : 750 gcm/min. The other brake should be checked in the same way.

3. Electrical adjustment

- 3.1 Supply QGB from a stabilized power supply.
- Progressively increase the voltage up to 25 V (check the current value at the same time).
- 3.2 Adjust the - 10 V voltage within 0,2 V
- 10 V \pm 0,2 V
- This should be done with a resistance placed between the base of Q32 and ground. Measure on TP11.
- 3.3 The oscilloscope connected to TP2.
- check if the correct HF signal (the tensiometer differential transformer supply signal) is present.
 $13 \text{ V} \leq V_{p-p} \leq 15 \text{ V}$
- 3.4 Switch off "Autom. Standby".
Push "Fast Winding" button.
The "Loading" switch in neutral position.
- 3.5 Place an insulating film between one of the tape-end contacts and the corresponding tensiometer plate.
Move forward the left tensiometer, then release it.
The QGB should start (it is important to hear a slight click produced by the brake release).
The right motor starts turning.
The left motor remains stationary if the "moving direction" cam is operating correctly.
The "rotating indicator" turns white.
- 3.6 Move the "Loading" switch on the right.
This should simultaneously suppress the "winding direction" cam action and stop the right motor.
Consequently, right motor should stop and the left one should start.
The rotating indicator turns black, to indicate that this function cannot be employed for normal running.

Move the "Loading" switch on the left.
The "rotating indicator" stays black.
The left motor stops, the right one starts to turn again.
Replace the "Loading" switch in neutral position.

- 3.7 Check of the "Fast Winding" knob action.
- Pull up the "Fast Winding" knob.
The rotating indicator" turns black once more for the same reason as before.
This time, both motors should rotate, because the "Fast Winding" knob suppresses the cam action.
Push down the "Fast Winding" button again.
- 3.8 Check of the "rotation detector" and of the correct operation of the bistable "ON-OFF" locking system.
Switch on the "Autom. Standby".
After 1,5 to 3 sec., the brakes operate and the QGB stops.
- 3.9 The "Autom. Standby remains switched on.
Press "Loading" switch to the left, then immediately to the right.
The system starts again but does not stop after 1,5 to 3 sec. as the "rotating detector" receives a "rotation signal" from the left reel-holder.
Manually stop the left motor, checking at the same time the supply current which should not be $< 0,65$ A.
1,5 to 3 sec. after complete motor stop, the brakes operate and the QGB stops.

This test should be performed to ensure rotating detector immunity from interference from the left motor when the motor is mechanically blocked.
- 3.10 Switch off the "Autom. Standby"
Switch on the QGB with the left tensiometer.
Decrease the power supply voltage till the "rotating indicator" turns black.

- $10,7 \text{ V} \leq \text{V supply} \leq - 11,3 \text{ V}$

(the rotating indicator should show that this voltage is too low for a normal running).
- 3.11 Switch on the main power supply : 25 V.
The "Loading" switch is in neutral position.
The "Fast Winding" button is pushed down.
Remove the left motor belts and switch on the QGB.
Check the voltage between - 10 V lines and the "Winding direction" detector output (red-blue wire).
Turn anti-clockwise the left reel-holder to displace the cam up to the block-stop.
Adjust then the potentiometer on "Winding direction" circuit in order to obtain 0,4 V (approximately, the voltage is near the one necessary to open the base-collector junction).
Turn the reel-holder up to the cam opposite block-stop. The corresponding voltage should range between 1,6 V and 2,2 V.
This test allows the check of the voltage progression which is dependant on the cam rotation angle (a too fast progression

could create an oscillatory phenomenon).

Perform the following test : move the cam to the left block-stop (corresponding to 0,4 V). The left motor turns at maximum speed. Turn now the reel-holder to the right till the motor stops. The rotation angle of the reel-holder should range between 180° and 270° .

Test objective : on one side, it is necessary to conserve a reserve for cam angular movement, indispensable to lock the motor.

- on the other side, if the reserve is too great, it means that there is a defect in the "moving direction" detector and the system could become instable.

- 3.12 Switch on the QGB and switch "Loading" to the right (the left motor turns).
Move the left tensiometer and check that the transition from maximum to zero torque of the motor is located between the tensiometer block-stops, about 10° around the central position. Replace the "Loading" switch in neutral position. Same test must be performed on the right tensiometer.

- 3.13 The right motor turns.
Move the "Winding direction" cam clockwise to the block-stop. Switch "Loading" to the left.
Move the right tensiometer in order to stop the right motor. Replace then "Loading" in neutral position : the right motor should turn.

This test permits the check of the servo-system on the right motor (same test of the left motor was checked under pt 3.11).

- 3.14 The QGB starts : if the "Fast Winding" button is pulled up, if the left tensiometer is moved forward, if the tensiometer is pulled up and touches "taut-tape" block-stop.

- 3.15 Switch "Loading" to the right. The left motor turns. Manually slow down the left reel-holder.
Pull up "Fast Winding" button. The reel-holder torque should decrease during about 0,5 sec. and immediately after should return to its normal value.

Switch "Loading" to the left and perform the same test on the other motor.

The temporary torque decrease is necessary, because the "Fast Winding" switch suppresses abruptly the "winding direction" cam effect which could induce a violent shock to the tape.

- 3.16 When "Autom.-Standby" is switched on and the brakes operate (after 1,5 to 3 sec.) the motors should still be powered during 1 to 2 sec. otherwise the tape would unwind. This fact could be checked by removing the belts and by manual slowing down the motors after switching on QGB and "Autom.Standby".
- 3.17 Switch off "Loading" and "Autom.Standby".
Switch on "QGB" and push to the "taut tape" block-stops the 2 tensiometers.
Move "Fast Winding" to neutral position and pull it up. On the first stage, nothing should happen. Moving the switch "FW" to the left then to the right, each time it provokes the corresponding motor start (left or right).

This test is performed to check if the "FW" action cancels completely at a specific moment and with restriction the tensiometer action.

- 3.18 Remove the insulating film placed between the tape end contact and the tensiometer plate.
Switch on the QGB and let the tensiometers touch the 2 tape end contacts.
At the same time, control -10 V stab. voltage. This voltage must subsist for 2 to 3 sec., after the tensiometers both touch the contacts.

The voltage then drops, brakes operate and everything stops.

Reason for the delay : sometimes, during a short period of time, both tensiometers touch simultaneously with tape end contacts. It is important that, at that time, the brakes do not operate causing the QGB to stop and possibly damage the tape.

- 3.19 Check on the oscilloscope TP1, TP3, TP4, TP7 and TP8 points. Check that the traces correspond to those given on the diagram.

Respect measure conditions given on the diagram. For a "triangular signal" voltage, lower and higher limit must range between -4,5 V and -8,3 V and the magnitude between -2,6 V, and -3,4 V peak to peak.

Check -9 V voltage : 8,9 to 9,1 V range.

Check that the voltage variation when the tensiometers move from one block-stop to the other (without touching them) is inferior to 0,3 V max.

4. Test with QGB fixed to NAGRA

- 4.1 Place a 10,5'' full reel on the left reel-holder. Tape running with the small reel (5'') on the right reel-holder. Adjust the potentiometer, corresponding to the left tensiometer (on the tensiometer circuit) in order that it is placed at about 6 mm from the tape-end mechanical block-stop (at about 5 mm from the electrical block-stop). Rewind completely the tape on the left reel. Fix the tape-end to a dynamometer, pass the tape around the QGB tensiometer and NAGRA left tensiometer. Then adjust the tensiometer spring in order to have 55 ± 2 gr. on the tape.

During adjustment : - switch off the "Autom. Standby" (unit is switched on)
- push the "Loading" switch to the right (left motor is powered)

If necessary, repeat the potentiometer adjustment during normal running and finally adjust the spring.

- 4.2 Normal tape running : adjust the potentiometer corresponding to the right tensiometer in order that the tensiometer is positioned half-way between the 2 extreme block-stops (when employing a 5'' reel, almost empty, it will be placed somewhat nearer to "taut tape " block-stop).

Adjustment of the right tensiometer spring : roll up 1 to 2 mm of tape on the 5'' right reel. The capstan is completely free. For a certain right spring tension, the tape runs from the left 10,5'' full reel to the small, nearly empty, right reel. Adjust the right spring tension in order that the tape stops.

- 4.3 "Reliever" resistance determination.
Separate the left tensiometer contact from the corresponding tape end contact. Distance to be kept between these 2 contacts : 2 mm.
Pull up the "Fast Winding" button and turn it anti-clockwise (FWD) up to the block-stop (adjustment without tape). Place a resistance (ranging between $390 \text{ K}\Omega$ and $1 \text{ M}\Omega$) in the place foreseen for the "reliever".
The left motor should stop turning at a certain resistance value.
The resistance should be adjusted in order to stop the motor running.
If the resistance value is rated between two E 12 standardized values, chose the highest value.

- 4.4 Stability control of the servo system :
- normal tape running
- tap lightly on the tensiometers in direction of Nagra.
- the tensiometers return quickly in the stable state.

Perform these tests with a 10,5'' nearly full reel on the left, and a 5'' nearly empty reel on the right.
Supply with a 30 V power source.

Perform a stability test on each of the 3 speeds.
Now supply with 12 V power source and perform again these tests.

Interchange the reels and perform the same tests.

Do not forget to tighten the reel nuts.

- 4.5 Supply with 15 V.
Load 10,5'' reels (one nearly empty, the other nearly full).
Control that, in the fast running mode, the full reel starts turning the almost empty reel.
Interchange the reels and perform the test once again.

- 4.6 Adjust the stabilized power supply to 30 V.
Wind on a 5'' reel the tape until 1,5 mm thick (on the left or right reel holder).
The second reel will be 7'' nearly full.
Operate a fast wind in the direction of the full reel.
When the nearly empty supply reel reaches a high speed, press the "FW" button in order to stop the fast tape running.
Perform this test twice.
Then, interchange the reels and perform same test twice again.
When the supply reel (the 5'' one, nearly empty) is on the left reel holder, the test must be performed with the "Autom. Standby" switched on.

Aim of this test :

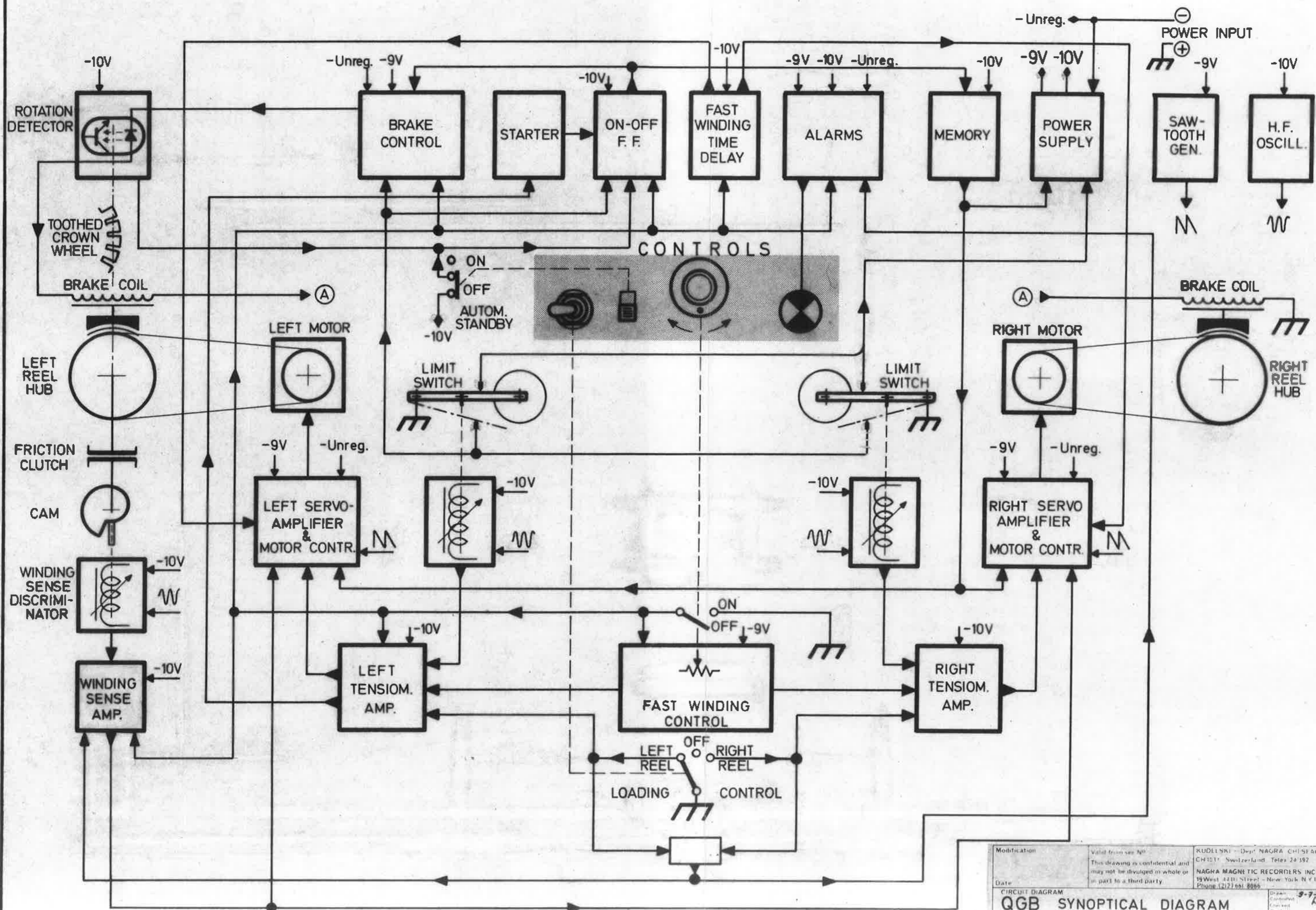
- a) When the small reel is pulled by the large one, overvoltages are created that could reach 140 V between the control transistor terminals of the corresponding motor. This transistor must accept the corresponding peaks.
- b) The small supply reel being loaded on the left, the "Autom. Standby" switched on, the correct running function is ensured only if the photo-transistor (in the rotating detector) reacts properly to the relatively high interruption frequency on the infrared beam. If not, the brakes should block during the running.
- 4.7 Keep on the 30 V power supply.
Control subjectively the fast running with the biggest and the smallest reels. No instability and no jerking should be noted on the tensiometers.
- 4.8 Control the QGB running with the internal NAGRA power supply.
- 4.9 Load a 5'' nearly empty reel on the left reel holder.
Run the tape with the 3 speeds. Control if there is any jerking on the left reel holder. The tensiometer should never touch " taut tape" contact. Minimum distance between contacts should be equal to 2 mm.

To check the security margin, switch "Loading" to the left : the tensiometer must go to the "tape end" block-stop. If the conditions are not respected, it will be necessary to control the left reel holder (winding direction cam, ball bearing a.s.o.).

The same check must be performed with the right reel holder. But it is sufficient to load with a small nearly empty reel on this reel-holder and control that there is a regular rotation and that the right tensiometer does not move.

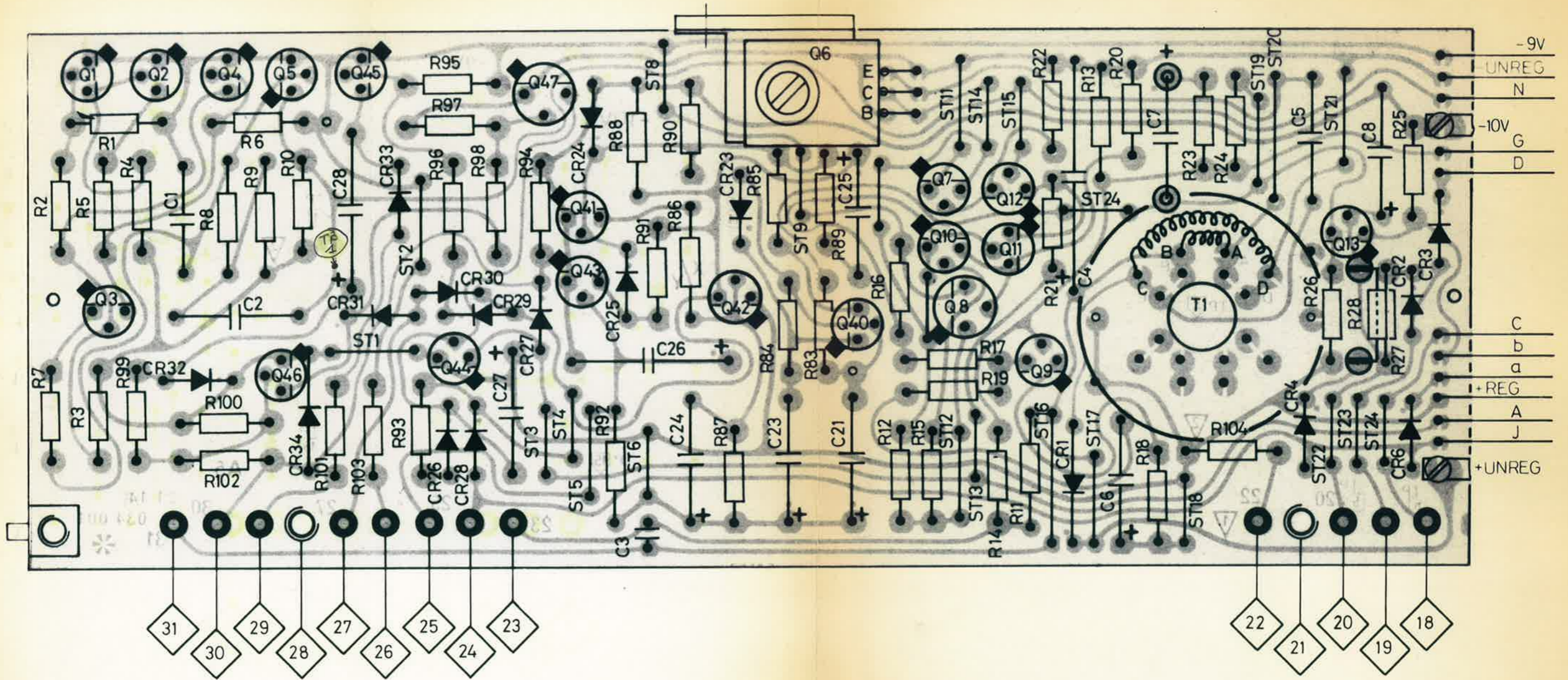
- 4.10 Load 2 metallic 10,5'' reels (left one nearly full, right one nearly empty).
Supply with a 25 V power and let the tape run at 15''/s.
Measure the consumption (of QGB only): $I \leq 200$ mA.
Interchange the 2 reels and perform again the test.
Note, that power consumption mainly depends on tensiometer spring tension.
- 4.11 Supply with 25 V.
Measure complete rewinding time (from right to left) :
 $t \leq 4$ min.
Use the 10,5'' metallic reel containing 1100 m. of tape.
- 4.12 Wow tests:
Use same reels as for test nr. 4.11.
Tape type 3M 206.
Measure wow with a Nagra in perfect condition.
Tolerances : at 15''/s. : 0,08% max. on VFM
 at 33/4''/s. : 0,2% " "
 at 1,5''/s : 0,3% " "

1 6 AOUT 1977



Modification	Valid from see 4th	KUDELSKI - Dep't NAGRA CHISEAUX CH101, Switzerland. Telex 24 192
Date	This drawing is confidential and may not be divulged in whole or in part to a third party.	NAGRA MAGNETIC RECORDERS INC 19 West 43rd Street - New York N.Y. 10036 Phone (212) 661-8066
CIRCUIT DIAGRAM		Drawn: 9-7-75 Checked: [Signature] Plotted: [Signature]
QGB SYNOPTICAL DIAGRAM		Copy: KUDELSKI 09.14.001.0.00

20 DEC. 1979



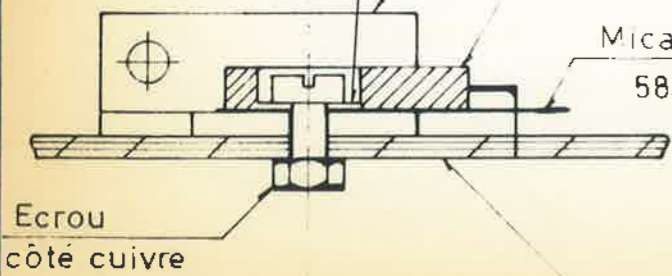
Remarque: Assembler les circuits avec un gabarit dans la fiche médiane.

Valable pour circuit indice

Canon isolant DF137A
5830 221 001

Refroidisseur 01 14 034 102
Monter parallèle au circuit Q6

Mica + 2x silicone DF 103 B
5830 220 000



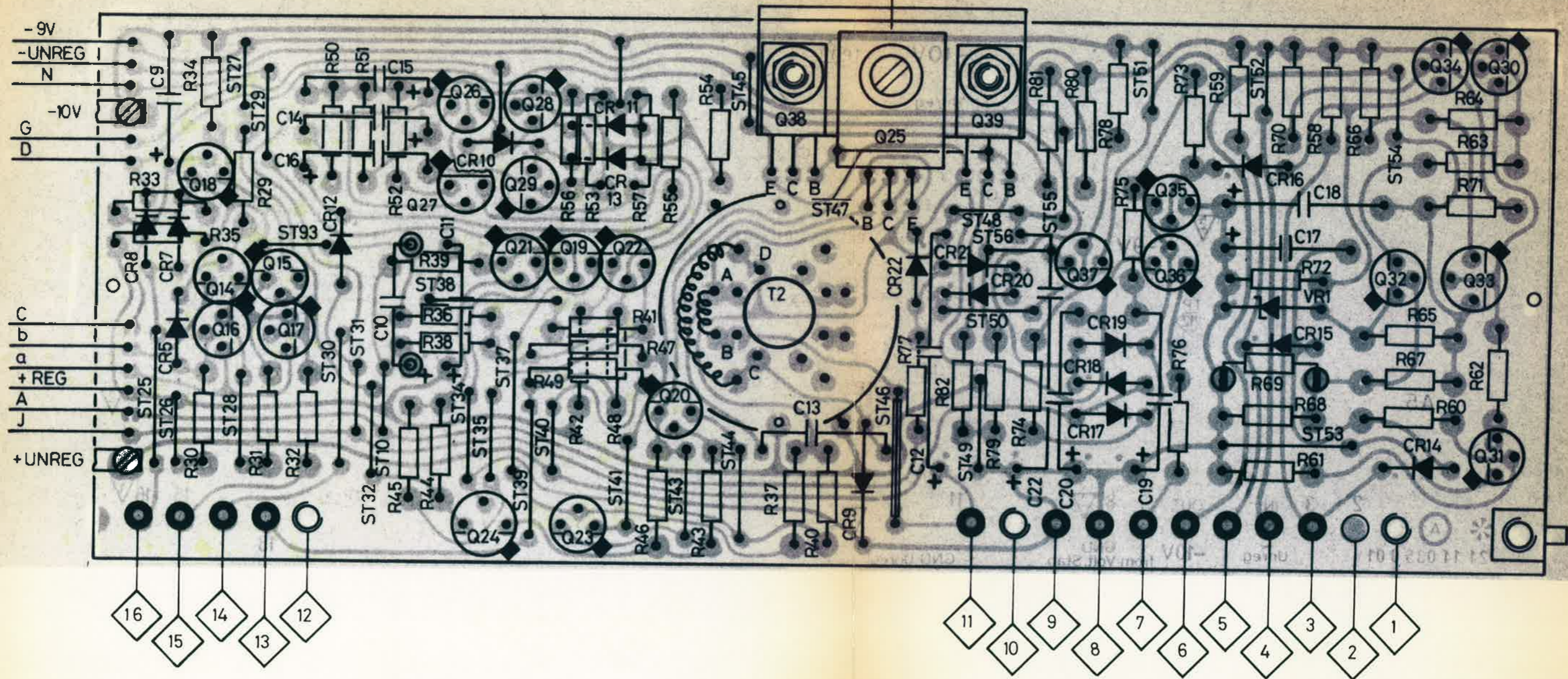
- Pylône de masse
- Contact mâle
- Contact mâle
- Contact femelle 01.01.100.102 (12x)
- Pylône 01.04.190.105 (2x)
01.04.190.106 (2x)
- Point test
- Rivet (2x)

Modif	Redessiné schéma - Renumeroté 1 26.10.78 F.Wenger	Inversé polarité 2 C7 25.10.79 lb	Ajouté pont sur Q10e 3 29.11.79 lb	Ajouté bobinage sur T1 4 20.12.79	5	6
Code	Matière		Traitement des surfaces:	Observations:	Cotation sans tolérances Cotes Trous	
Dimens	Quantité pr 100p:		Fam. pièces	Echelle	Dessiné	26.10.78 Wenger
Copie à:	Plan d'implantation		2:1		Contrôle	
Circuit principal gauche			Alpha num		A5	
QGB			97 14 034 000			

KUDELSKI S.A.

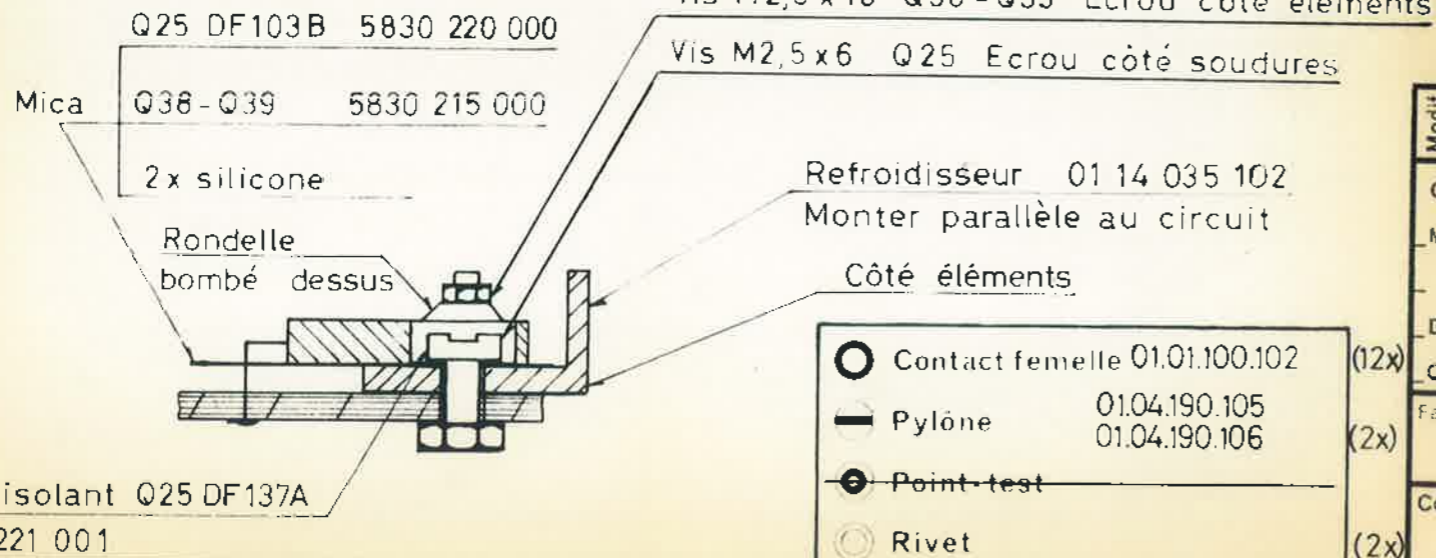
Remarque: Les transistors Q38 et Q39 sont prévus avec un brochage style 1 boîtier 77-03

Retourner les transistors pour le style 3 boîtier 77-03 avec l'adjonction d'une plaque de transfert de chaleur.



Remarques : 1^e Le contact femelle no. 2 ne doit pas être monté
2^e Assembler les circuits avec un gabarit dans la fiche mediane

Valable pour circuit indice **A**



Modif.	Redessiné schéma - Renuméroté	Ajouté ponts CR10 et R53, R57 2x	Ajouté bobinage sur T2		
1	27.10.78 F.Wenger	29.11.79	20.12.79		
Code :		Traitement des surfaces:	Observations:	Cotation sans tolérances	
Matière:				Cotes	Trous
Dimens:					
Quantité pr 100p :					
Fact. pièces	Plan d'implantation			Echelle	Dessiné
Copie à:	Circuit principal droite			2:1	27.10.78 Wenger
	QGB			Controlé	
				Alpha num.	A5
97 14 035 000					

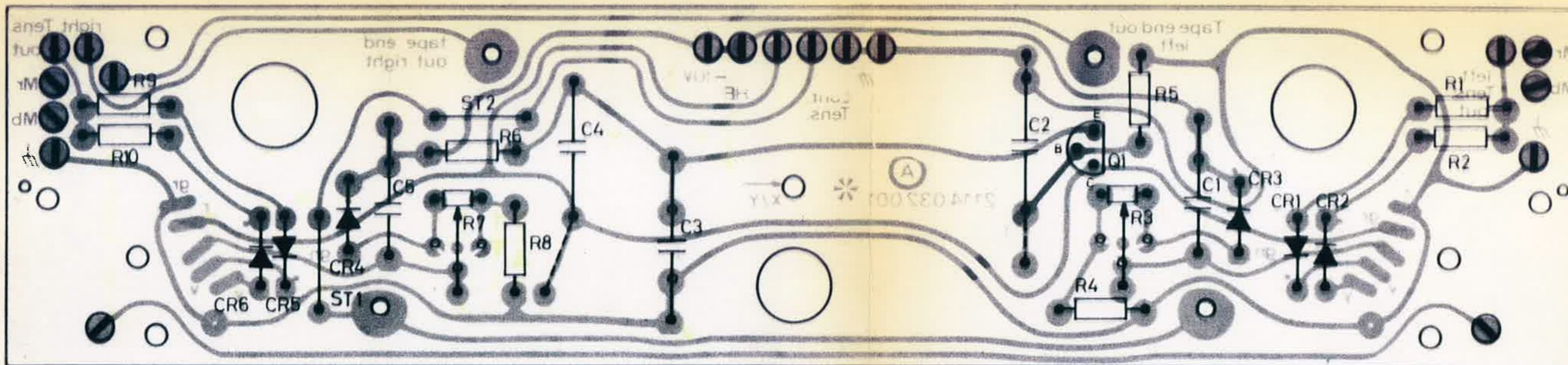
20 DEC. 1979

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DROITE

Vue côté éléments

GAUCHE

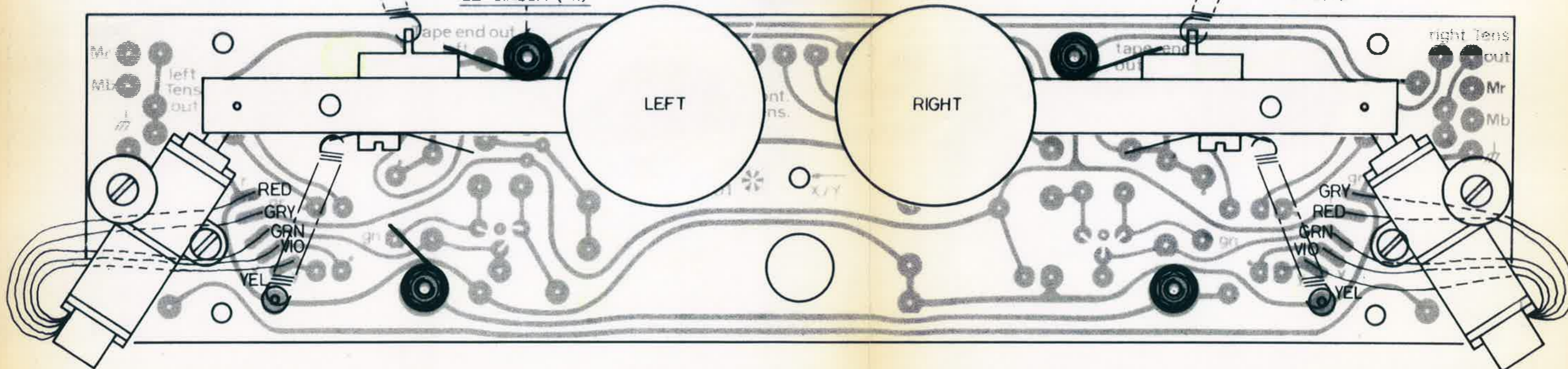


GAUCHE

SOUDER SUR LE CIRCUIT (4x)

Vue côté soudures

DROITE



Valable pour circuit indice **A**

CODE COULEURS

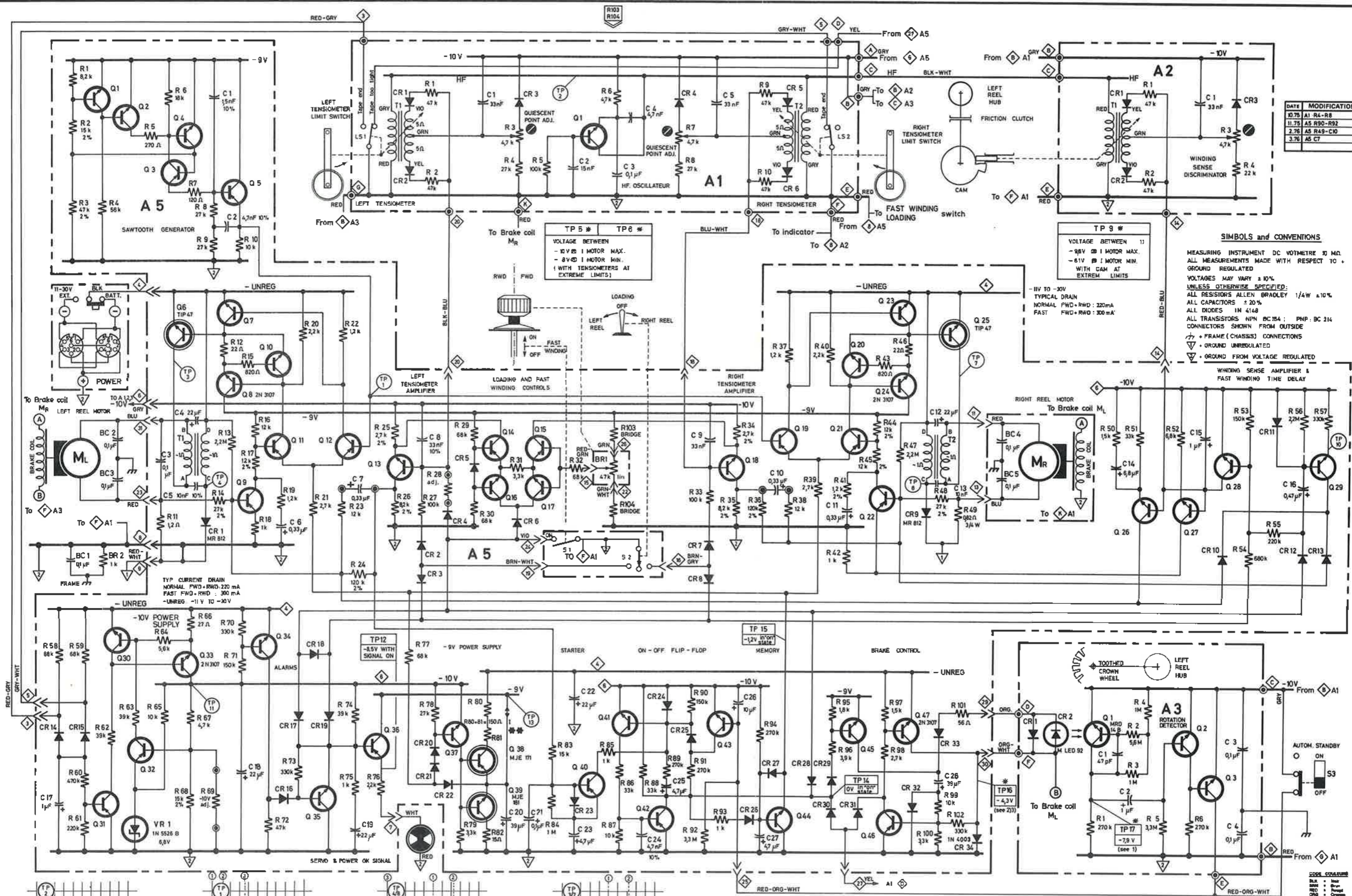
- BLK = Noir
- BRN = Brun
- RED = Rouge
- ORG = Orange
- YEL = Jaune
- GRN = Vert
- BLU = Bleu
- VIO = Violet
- GRY = Gris
- WHT = Blanc

Modif:	Redessiné schéma → Renuméroté				
	1	2	3	4	5
	31.10.78 F. Wenger				
Code :					Traitement des surfaces:
Matière:					Observations:
Dimens:					Cotation sans tolérances
Quantité pr 100p :					Cotes
Fam. pièces	Plan d'implantation				Trous
Copie à:	Tensiomètres				
	QGB				
Echelle	Dessiné	31.10.78	Wenger		
2:1	Contrôlé				
	Alpha num.	A1			
91 14 032 000					

- 9 OCT. 1979

KUDELSKI S.A.

18 JUN 1982



DATE	MODIFICATIONS
10.75	A1 R4-R8
11.75	A5 R90-R92
2.76	A5 R49-C10
3.76	A5 C7

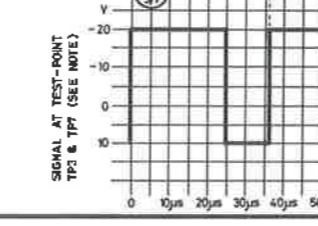
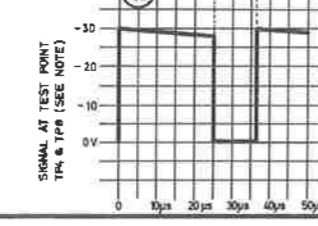
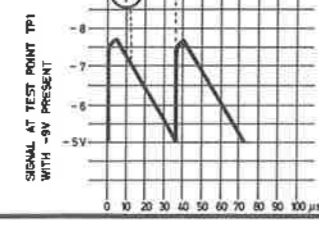
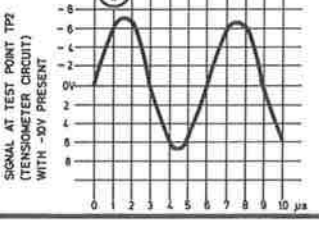
SIMBOLS and CONVENTIONS

MEASURING INSTRUMENT DC VOLTMETR 10 MD.
 ALL MEASUREMENTS MADE WITH RESPECT TO GROUND REGULATED
 VOLTAGES MAY VARY ± 10%
 UNLESS OTHERWISE SPECIFIED:
 ALL RESISTORS ALLEN BRADLEY 1/4W ± 10%
 ALL CAPACITORS ± 20%
 ALL DIODES 1N 4148
 ALL TRANSISTORS NPN BC154; PNP BC 214
 CONNECTORS SHOWN FROM OUTSIDE
 ▸ ▸ FRAME (CHASSIS) CONNECTIONS
 ▽ GROUND UNREGULATED
 ▽ GROUND FROM VOLTAGE REGULATED

TP 5 # TP 6 #
 VOLTAGE BETWEEN
 -10V & 1 MOTOR MAX.
 -8V & 1 MOTOR MIN.
 (WITH TENSIMETERS AT EXTREME LIMITS)

TP 9 #
 VOLTAGE BETWEEN 11
 -98V & 1 MOTOR MAX.
 -61V & 1 MOTOR MIN.
 (WITH CAM AT EXTREME LIMITS)

TYP CURRENT DRAIN
 NORMAL FWD+RWD: 220 mA
 FAST FWD+RWD: 300 mA
 -UNREG -11V TO -30V



THE CURRENT I IS EITHER SUPPLIED OR ABSORBED BY THE -9V POWER SUPPLY, ACCORDING TO THE MOMENTARY STATE OF THE BRAKE CONTROL AND THE SERVO-AMPLIFIER.

NOTE:
 SIGNAL MEASURING CONDITIONS FOR TP 3, 4, 7, 8:
 UNREGULATED SUPPLY VOLTAGE: 20V.
 THE MOTOR CONCERNED IS MECHANICALLY STOPPED AND THE CORRESPONDING TENSIMETER IN SUCH A POSITION AS TO CAUSE A TOTAL CURRENT DRAIN OF BETWEEN 250 AND 300mA.
 THE OTHER MOTOR REMAINS FREELY RUNNING.

VOLTAGE MEASUREMENT CONDITIONS

WHT (1) WITH -10V PRESENT
 Reference (2) WITH -9V PRESENT.
 (3) WITH -UNREG PRESENT DURING -0.5 sec.
 AT SWITCH-ON OF THE BRAKES OR WITH TENSIMETER IN "TAPE TOO TIGHT" POSITION.

KUDELSKI S.A. Dept. NAGRA NAGRA MAGNETIC RECORDERS INC.
 CH-1028 CHISEAUX NEW YORK, N.Y. 10108
 Switzerland 18 West 41st Street

A1to5

QGB 09 14 002000 4 9 79

LARGE REEL ADAPTER FOR NAGRA IV-S IV-SJ 4.2