INSTRUCTION MANUAL

JP30A

Non-Destructive Insulation Tester

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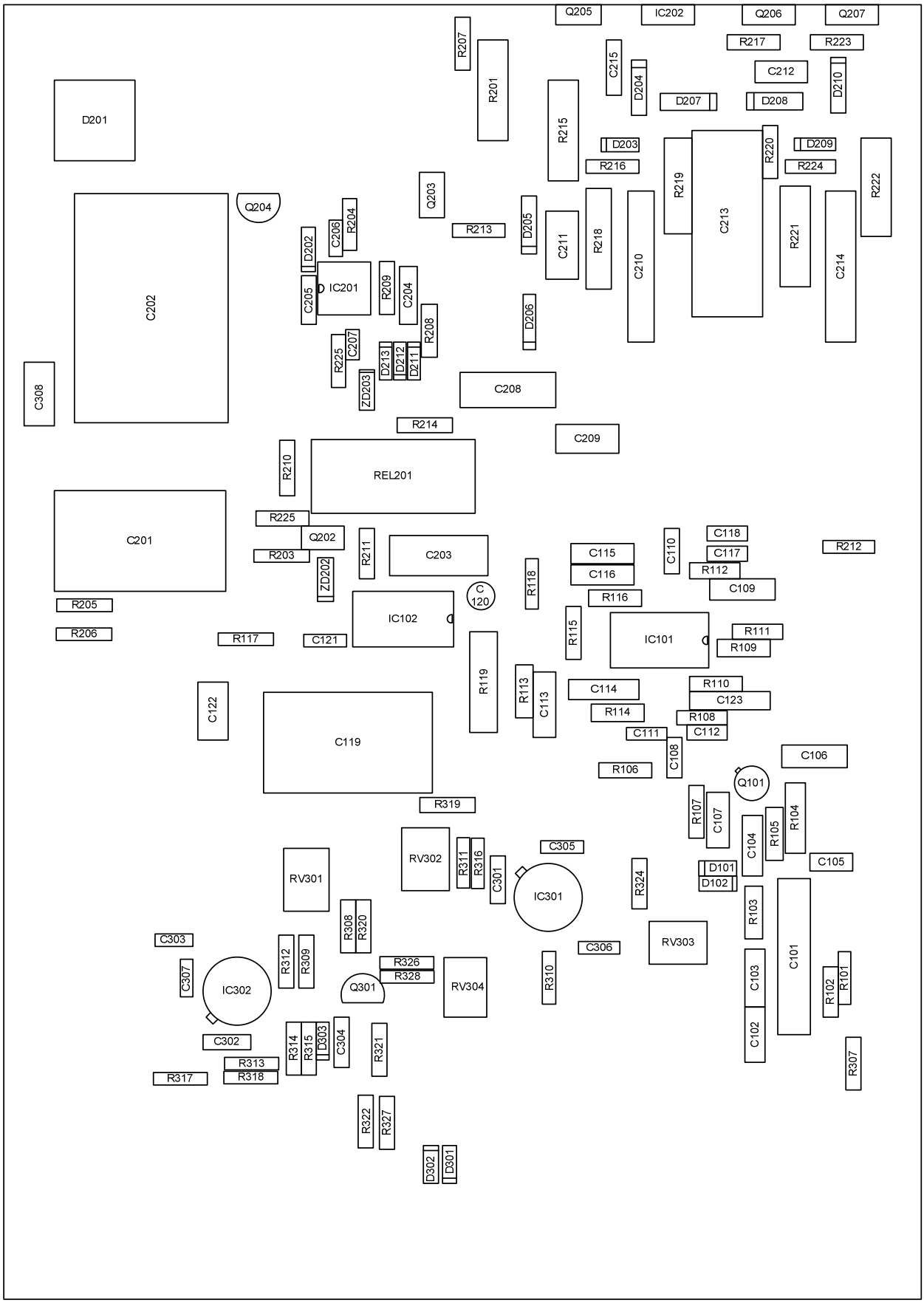

INTRODUCTION

The JP30A Non-destructive Insulation Tester provides a dc voltage adjustable up to 30kV. The output voltage and current are indicated on separate meters.

Ionisation is audible indicated by a built-in loudspeaker.

SPECIFICATIONS

Test Voltage: 0-3kV, 0-10kV, and 0-30kV dc adjustable by a 10-turn potentiometer.

Voltmeter: 3 ranges, 3kV, 10kV, and 30kV f.s., accuracy +/- 5% f.s.

Max. Output Current: Approx. 150µA @ 30kV increasing to 200µA @ 8kV, decreasing to 2µA with output shortened.

Current Meter: 3 ranges, 1µA-10µA-100µA f.s., accuracy +/- 5% f.s.

Output Resistance: About 600kΩ at 30kV -10kV
200kΩ at 10kV - 3kV
60kΩ at 3kV - 2kV
(Measured by I-out 100µA)

Stability: Output voltage varies less than +/-1% for +/-10% supply voltage variation.

Indication of Ionisation: An active L.P. filter amplifier in series with an integrated audio amplifier feed a loudspeaker providing an audible indication of ionisation. Amplifier gain is adjustable by a potentiometer.

An output pack socket provides external indication, using headphones or oscilloscope. Min. load 100Ω.

Test Voltage Output: The test voltage is supplied via a high voltage socket to a shielded test lead terminated in a test probe. 2 interchangeable probe tips are provided, one ball-pointed for use up to 30kV, and one straight-tipped with 4 mm shank for use up to 15kV. Low tension lead is connected to earth terminal.

Test Voltage Switch: The high tension is switched on with the H.T. switch on the front panel or an external H.T. switch connected to the "Ext. H.T." jack socket.

Meter Outputs: A 5V f.s. meter output is provided on the rear panel output socket.

Guard Terminal: For connection to guard electrode. Current to this terminal by-passes the current meter.

Power Supply: 100-130V and 200-260V AC, 50-400Hz, consumption 15-30W depending on output voltage and current drawn.

Dimensions:
Height: 148 mm
Width: 438 mm
Depth: 300 mm

Weight: 6,2 kg.

Temperature Range:
Operating temperature: 10°C to 40°C
Storage temperature: -20°C to 70°C

OPERATING INSTRUCTIONS

INSTALLATION

Check that the main voltage selector is set to the actual supply voltage. The selector switch is located on the rear panel above the inlet for mains power. Change the setting by sliding the switch to the correct position. Check that the correct fuse is fitted, on 115 volts 0.5A slow (T), on 230 volts 0.25A slow (T). The fuse is fitted on the mains power inlet.

WARNING! **If a 3 lead power socket with earth is not available, the instrument must be earthed using the front panel earth terminal.**

FUNCTIONS OF CONTROLS, METERS, CONNECTORS, ETC

Power Switch

Switch on the Rocker-switch on the left side of the front panel.
A built-in lamp indicates power on.

H.T. Switch on the Front Panel

Applies high tension as long as it is depressed. A red lamp indicates H.T. on.

H.T. Control

A 10-turn potentiometer adjusts the high tension from zero to full scale meter deflection (set by the H.T. range switch).

H.T. Range Switch

Switches the µA meter ranges in steps of 1µA, 10µA, and 100µA full scale meter deflection.

Amplifier Gain

A front panel potentiometer adjusts the noise amplifier gain to provide a suitable noise output.

H.T. Connector

Female panel connector for the supplied shielded high tension output cable.

Earth Terminal

For connection to the low terminal of the test object.

Guard Terminal

For connection to a guard electrode on the test object to eliminate unwanted leakage currents from measurements

Ext. H.T. Switch Jack Socket

For connecting external switch to apply high tension.

Phone Jack Socket

For external phone or oscilloscope. Minimum external load impedance 100Ω.

Rear Panel Connector

Meter outputs. Pin 1: kV meter, Pin 2: common, and Pin 3: A meter. Both meter outputs provide +5 Volt for full scale meter reading. Minimum external load resistance 10kΩ.

OPERATION

Plug-in the connector of the H.T.-probe cable.
Connect earth lead to low terminal of test object. Turn H.T. control fully anti-clockwise. Set the AF-gain control to mid-position. Set meter range switches to required range.

Apply the high tension probe to test object terminal. Depress the red H.T. button - this switches on the H.T. as indicated by the red lamp. Increase the H.T. gradually by turning the H.T. control clockwise and check the voltage and leakage currents on the meters.

When the H.T. output is increased above a certain value, in most cases a noise is heard from the loudspeaker. This is an indication of ionisation in the material tested.

The ionisation current produces a characteristic noise signal, usually starting with a hissing sound. When increasing the voltage the noise gets louder, and eventually sharp clicks are heard, which indicate partial break-down of the insulation.

Finally, total break-down occurs and the test voltage drops to zero. Ionisation normally occurs in air voids or other inhomogenities in the insulation. Thus, completely homogeneous materials, e.g. plastics do not produce any noise before complete break-down occurs.

OPERATIONAL NOTES

At ambient temperatures below or above normal a small meter zero shift will occur. This may be corrected if necessary by the mechanical meter adjusters.

When the high tension output is increased gradually, a small noise output will be observed. This is due to charging effects in the dielectrics of the H.T. unit and the probe cable, and it disappears when the output stabilizes. A momentary deflection of the current meter will also be observed due to charging of the cable capacitance, but this disappears in a few seconds.

When switching from a low H.T. range to a higher H.T. range the H.T. control must be turned anti-clockwise in order to avoid a sudden voltage rise on the test object.

A resistor in series with the cable limits the short-circuit discharge current to a safe value, so that no damage results from intermittent spark discharges. None the less, repeated discharges at high output voltage should be avoided in order to prevent damage to this resistor.

WARNING!! The discharge energy is less than 0.2 joules at maximum output voltage, ensuring safe operation. However, if used for testing capacitors of above 500pF at high voltages, the usual precautions are necessary to prevent access to high potentional points. For this reason it is dangerous to extend the length of the H.T. cable.

When the instrument is used for testing high value capacitors or long cables with high cable capacitance <above 0.02uF an excessive charging time will result, as the available charging current at low voltage (100V) is limited to above 10uA.

Example: 200nF charged to 500V: Charging time~30 sec.

The ball-point probe tip provided is suitable for use up to the maximum test voltage. The pin-end probe tip may be used up to about 11,5KV, or, when applied to a large diameter test point, at higher voltage, depending on the distance to earthed objects.

The probe tip may also be used as screw terminal by fixing a lead between the tip and the insulating probe shaft. AII critical components in the high voltage units are hermetically sealed so that the instrument is suitable for operation in all normal environments. However, in case or prolonged exposure to high humidity during storage or transport it is advisable to operate the instrument continuously for some days at maximum output voltage in order to eliminate any absorbed moisture, which may cause spurious noise currents.

CIRCUIT DESCRIPTION

REGULATED POWER SUPPLY AND POWER OSCILLATOR

One half-section of bridge rectifier D201 provides the main positive supply (about +34V) for the stabilizer. An auxiliary positive supply, stabilized at 12 V by the 3-terminal voltage regulator IC202, is taken from the main supply via R201.

The second half-section of D201 provides a negative supply, stabilized at -6.2V by series transistor Q202 and zener diode ZD202.

REGULATED POWER SUPPLY

The regulating circuit comprises series transistor Q205 and driver Q203 control led by the operational amplifier IC 201. Q204 is a current limiter activated by the voltage across R205 in parallel with R206, which passes the total current.

IC 201 compares the actual H.T. output, measured by IC 301, with the preset value set by the H.T. control potentiometer RV402. The difference is inverted, amplified and via R204 fed to the base of 0203.

H.T. SWITCHING

In stand by (when the H.T. switches are deactivated) the H.T. relay RL201 short circuits RV402. The output of IC 201 is clamped to -0.3V by D202, which forces the regulator output to zero.

When one of the H.T. switches is activated, the red H.T. lamp turns on, RL201 opens and the output of IC 201 goes positive for normal regulating operation.

POWER OSCILLATOR

This is a push-pull class C oscillator operating at a frequency of about 25 kHz. (The resonant frequency of the high voltage secondary winding).

A bias network (R215-D205-D206-C211) applies a positive bias to the oscillator power transistor Q206-Q207, in order to ensure reliable start of the oscillator at low supply voltage.

A peak-limiting network R218-R221-D207-D208-R220-C213 eliminates positive spikes at the collectors of Q206-Q207.

A separate center-tapped feedback winding on L501 is connected to the bases of Q206-Q207. D204-D210 prevents negative base drive.

HIGH-VOLTAGE CIRCUIT

The output winding on L501 supplies an AC voltage at max. 6kV peak to the quintupler circuit D501 to D505 and C501 to C505.
The quintupler output is smoothed by R501-C506 and fed to the output connector via R502-R503.

R504 is part of the voltage divider for the kV meter circuit and C507 couples the noise voltage developed across R502 into the audio amplifier.

D506-D507 suppress high-voltage spikes.

The negative line is floating and connected to the input to the current meter amplifier via R305, and to the guard terminal.

C101 decouples the negative line to ground.

METER AMPLIFIER

The voltmeter amplifier IC 301 is connected as a non-inverting amplifier. Potentiometer RV302 adjusts the gain to compensate for variations in the high voltage resistor R504 (5% accuracy).

The current through the range resistors R301 and R306 goes to the negative high voltage line and is not measured on the current meter.

The current meter amplifier IC 302 is connected as an inverting amplifier with current feedback through the range resistors.
RV301 adjusts the offset in IC 302, Q301 is an overload protection of IC302. When the output of IC 302 exceeds 5.5V (I/out~110pA), Q301 saturates and short circuits the range resistors.

NOISE VOLTAGE AMPLIFIER

The noise amplifier comprises a low noise transistor Q101 feeding the active L.P. filter amplifier IC 101, followed by an integrated audio amplifier IC 201. IC 102 drives the loudspeaker via C122

The L.P. filter rejects ripple at the oscillator frequency to prevent amplifier overload, and D101-D102 are spike suppressors.

MAINTENANCE AND SERVICE

In order to obtain easy access to the PC board and the H.T. unit, loosen the four screws in the top cover and remove the cover.

ADJUSTMENTS

Normally no adjustments are necessary except when certain components are replaced.

If IC 302 is changed adjust RV301 for current meter zero (with the H.T. switches deactivated).

RV302 adjusts the kV meter sensitivity and should only be adjusted if an accurate voltmeter is available, having a range of 3kV full scale and input current less than 50uA

HINTS ON FAULT FINDING

SYMPTOM	LIKELY FAULT
1. No High Voltage:	
a) No regulated output	Check the unstabilized supply for Q203 or Q205 open, Q204 shorted, IC 201 defective
	Short circuit in power oscillator circuit Q206 or Q207
b) if a) is O.K., but no oscillator output (measure at R218 or R221 on L501 primary) :	Defect in high voltage unit. Unsolder the connection from L501secondary to high voltage unit, and check that power oscillator is functioning
2. High Voltage Output above 30kV, adjustment not possible:	IC301 or IC201 defective, or wiring from RV402 to ic201 pin 3 broken
3. Max. High Voltage Output less than 30kV:	
a) Noise output increases with voltage:	Flashover in high voltage unit or H.T. cable
a) Noise output increases withvoltage:	Defective high voltage unit. Q206 or Q207 open (check voltage across R219, R222 about 0,3V at 30kV
	kV meter circuit defective Check regulated output

(0-16V)

JP30A CALIBRATION:

Test equipment:	5 digit Digital Voltmeter (DVM) 40kV HT Voltmeter (HTVM) with toll. 5% 100MOhm high voltage resistor toll. 1% 300MOhm high voltage resistor toll. 1%
Adjust current meter amplifier:	Connect the DVM to SC601 pin 3 and adjust RV301 to zero reading, with the High Tension deactivated.
Adjust volt meter amplifier:	Connect the DVM to SC601 pin 1. Set HT range to 10kV and current meter to 1001JA, switch on HT and adjust to 5.000V reading on the DVM with the HTVM connected to the probe. Adjust RV302 to 10kV reading on the HTVM. Adjust RV303 to 10kV reading on the kV meter.
Adjust current meter full scale:	Connect the DVM to SC601 pin 3, switch on 10kV HT with 100MOhm connected between the probetip and ground. Adjust RV304 to 100IJA reading on the current meter.

CHECK CALIBRATION:

Check kV meter:	Connect the DVM to SC601 pin 1 and the HTVM to the HT probe. Range 30kV: HTVM reading 30kV within 5% DVM reading 5.00V Range 10kV: HTVM reading 10kV within 5% DVM reading 5.00V Range 3kV: HTVM reading 3kV within 5% DVM reading 5.00V
Check uA meter:	Connect the DVM to SC601 pin 3 and the HTVM to the HT probe. Range 100uA: 100MOhm load HT = 10kV DVM reading 5.00V Range 10uA: 300MOhm load HT = 3kV DVM reading 5.00V Range 1uA: 300MOhm load HT = 300V DVM reading 5.00V

danbridge as

Overensstemmelseserklæring efter EMC direktivet 89/336/EØF

Certificate of agreement according to EMC regulation 89/336/EEC

Apparat: **JP30A**
Equipment:

Kategori **Category**	High Voltage Insulation Tester
Type	JP30A HA12
Beskrivelse **Description**	Non-destructive insulation tester 0 - 3 KV., 0 - 10 KV. and 0 - 30 KV. 1µA - 10 µA - 100 µA. Resolution 10 nA. Accuracy ± 5%

Fabrikat: *DANBRIDGE A/S*
Manufacturer: **Hirsemarken 5, DK-3520 Farum, Denmark**

Overensstemmelsen er erklæret i henhold til:
The conformity is declared according to:

De aktuelle standarder: *EN 50081-1* and *EN 50082-1*
The current standards:

Dato: 95-10-06
Date:

Underskrift:
Signature:

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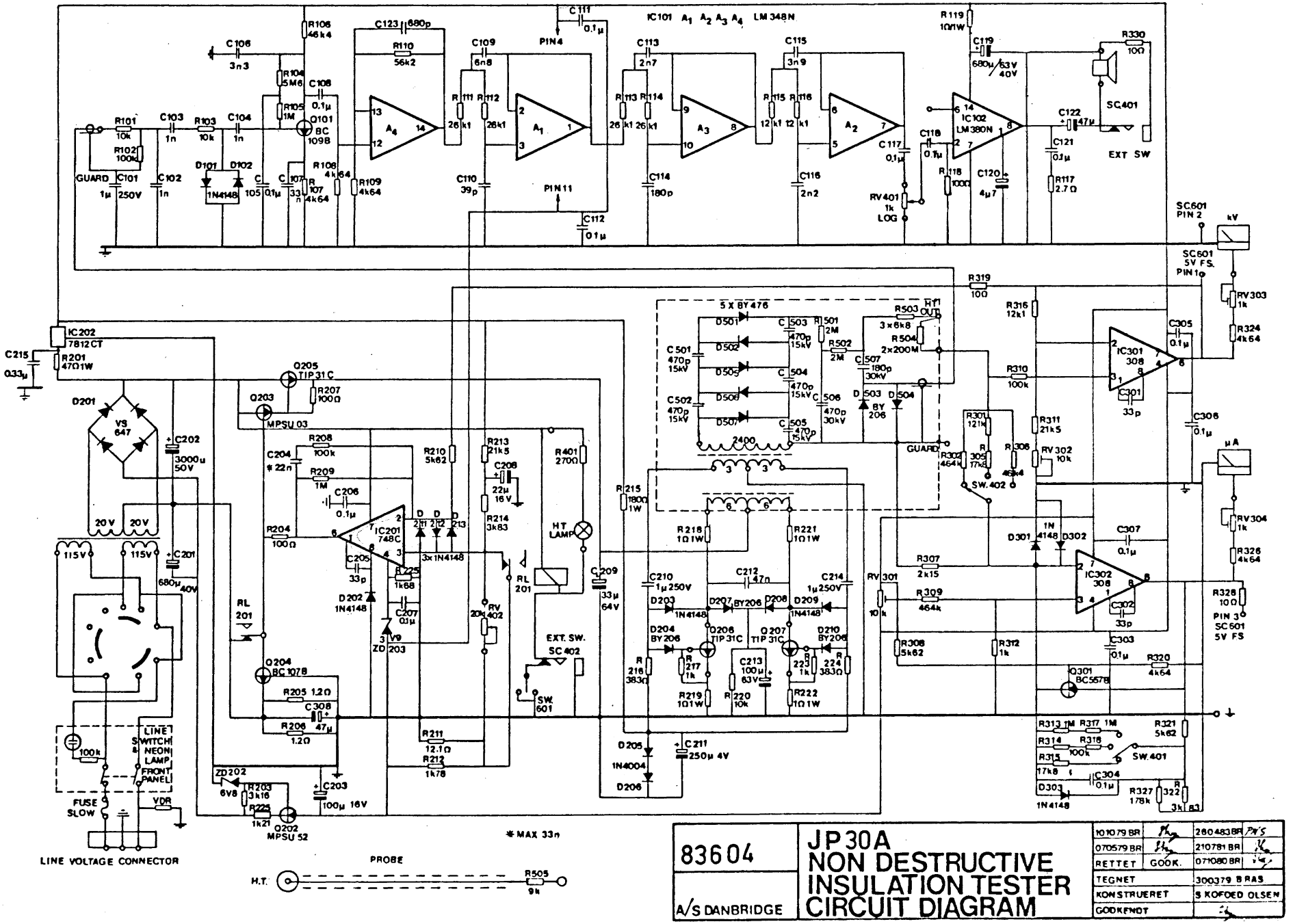

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A/S DANBRIDGE			

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070579 BR			
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TEGNET		300379 BRAS	
KONSTRUERET		S KOFOED OLSEN	
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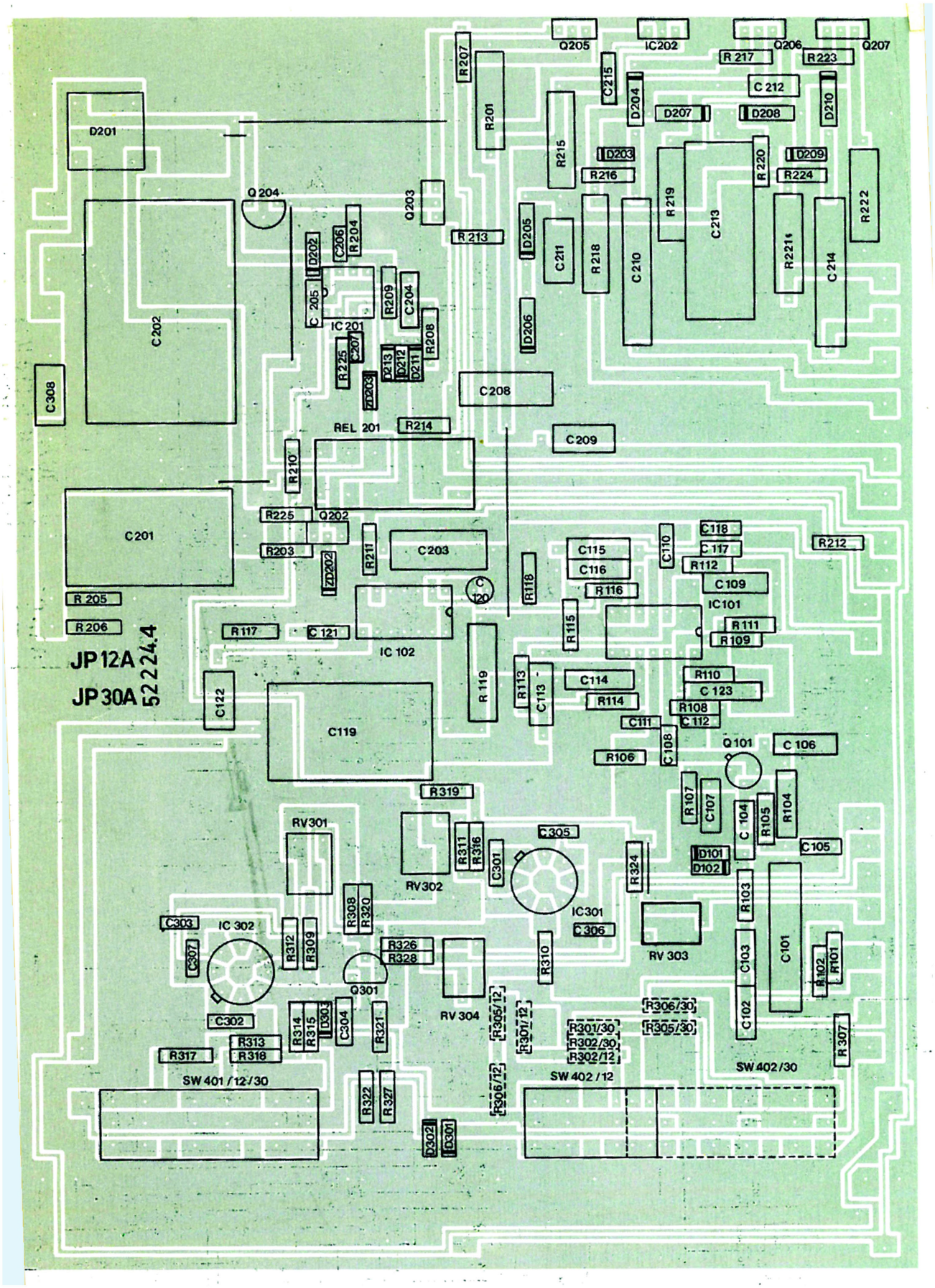
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