

Table of Contents:

Test Report
BASC Prospect
General about Probe Construction
Electronic Circuit in Probe
Circuit Diagram
Component List
Instruction for Use
Dismantling and Assembling Instruction

MANUAL FOR THE
B A S C - Gamma Probe
January 1964

Test report.

BASC-Gamma Scintillation Detector No. Date of test

Supplied to:

Preamplifier: type

linearity checked:

gain :

overload point :

output impedance :

Photomultiplier: Manuf.: Type: Ser.no.:

Pulse Height/Energy Calibration: For a high voltage of V this probe is adjusted to give signals corresponding to approx. 1 mV = keV, when used with cable as specified below.

Adjusted by means of:

Temperature Compensation:

Crystal: Manuf.: Type: Ser.no.:

Dimension: cm

Centre of crystal about 27 mm from the bottom.

Background: At 20 mV Disc. settings, HV= 1000 V and with probe shielded by 2" lead cps. Measured with BASC No.:

Cable: Type: No.: Length in m:

Diameter: Marked for every: cm

Plug on cable: Type:

" " probe: Type:

Modifications:

Checked by

.....

General about Probe Construction.

The gamma probe comprises a pressure and water tight stainless steel housing containing a NaI(Tl) scintillation crystal, a photomultiplier tube and a transistorized preamplifier. The power is supplied to, and the signals taken from this unit via a special 4 core cable and a connector over which a cap is screwed into the stainless steel housing. Sealing is accomplished by means of an "O" ring, and the cable enters the cap through a double rubber seal, thus making the whole unit tight.

The crystal, photomultiplier and the preamplifier assembly is contained in a plated brass tube which fits into the stainless steel housing. It is centered by means of 2 rubber shock absorbers thus making the probe more shock-proof.

Connection of Probe.

Set the POWER and HIGH VOLTAGE control knob to the OFF position before connecting the probe cable to the PROBE plug on the BASC.

General Operation.

In connection with the standard scintillation detector for general gamma measurements the input sensitivity switch on the BASC should be set at 20 mV and the discriminator potentiometer at 1.00 corresponding to an input sensitivity of 20 mV or about 20 keV. In this position the scintillation detector will work with the highest possible stability.

Electronic Circuit in Probe.

Description.

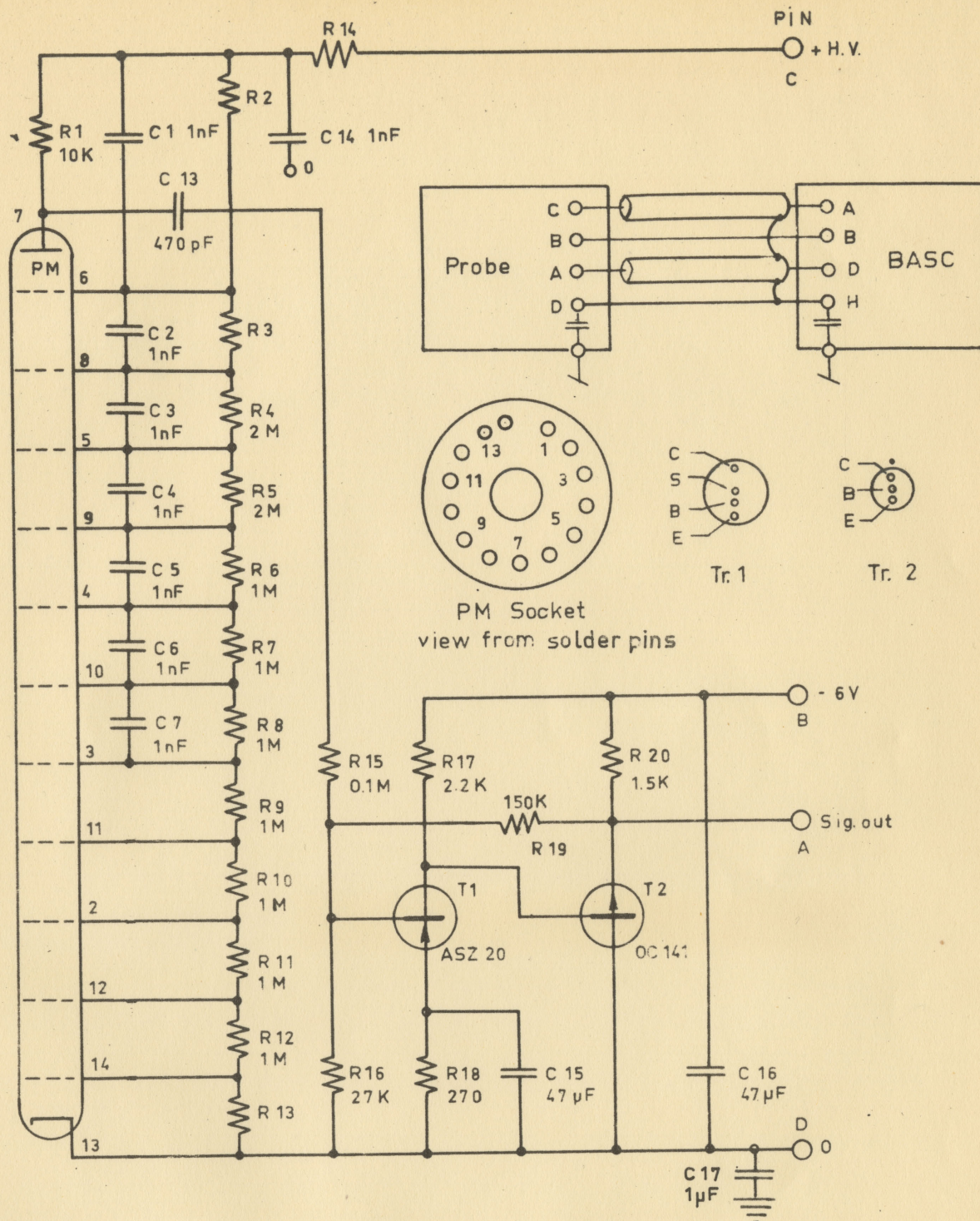
All the components for the photomultiplier dynode chain and the preamplifier are mounted on a printed circuit board between the photomultiplier socket and the plug at the cable inlet.

Neg. pulses at the photomultiplier's anode pass via the coupling condenser C 13 and the resistor R 15 to the transistor Tr 1 and the emitter follower Tr 2. For increased stabilisation feedback is obtained by R 19.

Adjustment of photomultiplier gain.

R 14 is used to adjust for the difference in photomultiplier amplification factor for individual tubes. In the case of change of the photomultiplier etc. one should compare data obtained before (see: Test Report) and after the change. In this connection it is recommended to determine the pulse height for 2 or 3 isotopes (Cr-51, Cs-137, Co-60) with an oscilloscope. The pulses are available inside the BASC at the PROBE plug, pin D.

If the pulses are lower or higher than specified in the Test Report, the value of R 14 should be reduced, respectively increased until the original pulse height/energy calibration is obtained again.



Inside probe connections

Pin A Sig. out

Pin B -6V

Pin C +H.V.

Pin D Common and ground

Cable plug connections

Pin A +H.V.

Pin B -6V

Pin D pos. Sig out

Pin H Common

	MATERIALE: MODEL NR. LAGER NR.	A/S DANBRIDGE	MAALFØR: TEGN. JN 641120 KONF. ERSTATNING FOR: 631115 GP - 201 - 4 ERSTAT ET AF
	BASC Standard Gamma Probe		

Circuit
Designation

Value

Manufacturer

Spec.

R 1	10k Ω	Beyschlag	1/3W
R 2	1.2M Ω	"	"
R 3	2.7M Ω	"	"
R 4	2M Ω	"	"
R 5	2M Ω	"	"
R 6	1M Ω	"	"
R 7	1M Ω	"	"
R 8	1M Ω	"	"
R 9	1M Ω	"	"
R 10	1M Ω	"	"
R 11	1M Ω	"	"
R 12	1M Ω	"	"
R 13	1.5M Ω	"	"
R 14	adj.	"	"
R 15	0.1M Ω	"	"
R 16	27k Ω	"	"
R 17	2.2k Ω	"	"
R 18	270 Ω	"	"
R 19	150k Ω	"	"
R 20	1.5k Ω	"	"

C 1	1nF 150V	Ferroperm	9/0138.8
C 2	1nF 500V	"	9/0138.9
C 3	1nF 150V	"	9/0138.8
C 4	1nF 150V	"	9/0138.8
C 5	1nF 150V	"	9/0138.8
C 6	1nF 150V	"	9/0138.8
C 7	1nF 150V	"	9/0138.8

C 13	470pF 5kV	Ferroperm	9/0133.9-5kV/D
C 14	1nF 5kV	"	9/0133.9-5kV/D
C 15	47 μ F 6V	"	TB 300 Tantalum
C 16	47 μ F 6V	"	" "
C 17	1 μ F 100V	Siemens	B32110-A0105-M

T 1	PNP-Ge	Philips	ASZ 20
T 2	NPN-Ge/Si	Philips/G.E.C.	OC 141/2N2714

Photomultiplier E.M.I. 9524B

Crystal 1" ϕ x 1" NaI-Tl Harshaw 4PA4

We reserve the right to deviate from this specification

	MATERIALE:	MODEL NR.	A/s DANBRIDGE	MAALFØRH.	TEGN.	B.L.
		LAGER NR.		KONF.		
	Standard Gamma Probe List of Components			ERSTATNING FOR: G-P-202-4		
				ERSTATTET AF:		

Dismantling and Assembly Instruction of BASC Gamma Scintillation Detector.

Dismantling: Removal of Scintillation Detector.

0. Disconnect cable from the BASC.
1. Hold on the long section of the detector housing and unscrew the short part, the bottom.
2. Make "positions marks" on the long outer part and the inner housing so you will be able to replace the inner part in exactly the same position later. Pull out slowly the inner part, the scintillation detector with an O-ring.
3. The inner detector house can be loosened by unscrewing 3 small screws near the plug.
4. The inner parts consisting of the plug with preamplifier, the photomultiplier (PM) and crystal can now be carefully and slowly removed by pulling and rotation. Be careful; the crystal is now only held to the PM by a silicone compound and should be removed to avoid dropping of the crystal. After cleaning of the PM and the crystal with alcohol, store them in a dark and safe place. Do not push out the crystal with a pin through the hole in the bottom.

Assembly of Scintillation Detector.

1. Place cleaned crystal with the glass end up. The crystal should look transparent.
2. For a good optical contact between crystal and PM, apply about 30 mm³ of silicon grease or still better DOW CORNING gel, type Q2-2-0057 on the centre of the crystal window.
3. Slide on the mumetal shield with the three strips of foamrubber inside in place, and place PM on the top of the crystal and press down.
4. Lift the assembly and place it horizontally and direct the socket of the PM into the right position in the socket of the preamplifier housing and press slowly and carefully together.
5. Check that the rubber in the bottom of the inner detector housing is in the right position (flat) and of the correct height.
6. Slide inner house over the assembly, press light for lining holes and fix the 3 screws.
7. Check that the O-ring around the plug is in place.
8. Place the assembly inside the long steel section. Line up the position marks and press in the assembly, hereby the plug parts are connected.
9. Clean the threads at the junction and place the O-ring in position at the junction. Check that the O-ring is in position in the bottom of the short part.
10. Screw on the short part. Hold on the long section and screw on the short part, which should only be screwed on by hand, as the O-ring must not be squeezed out of the groove.

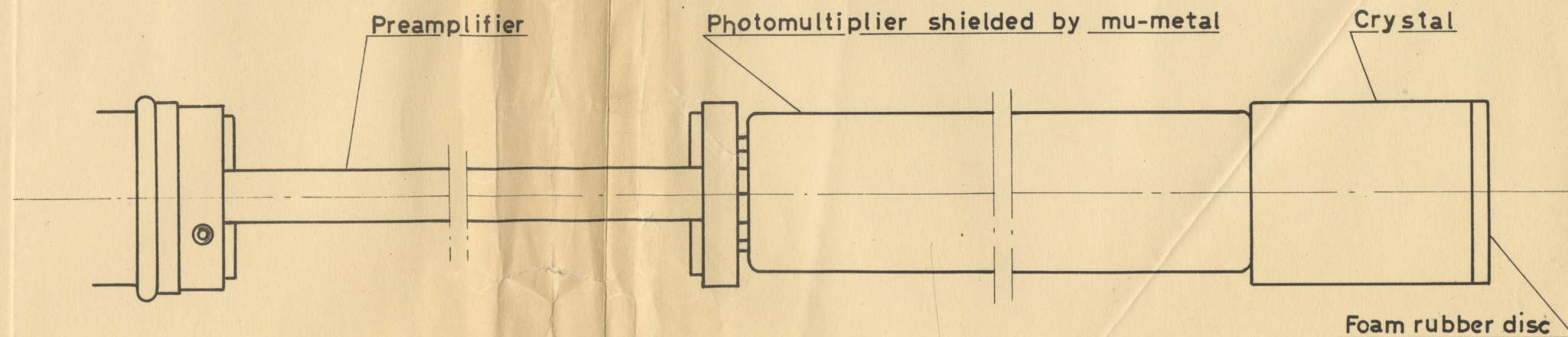
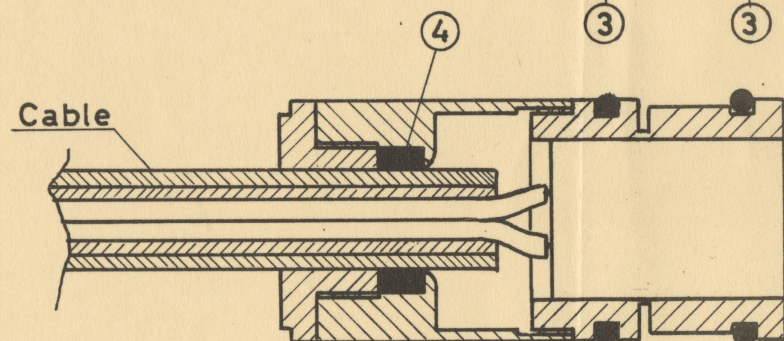
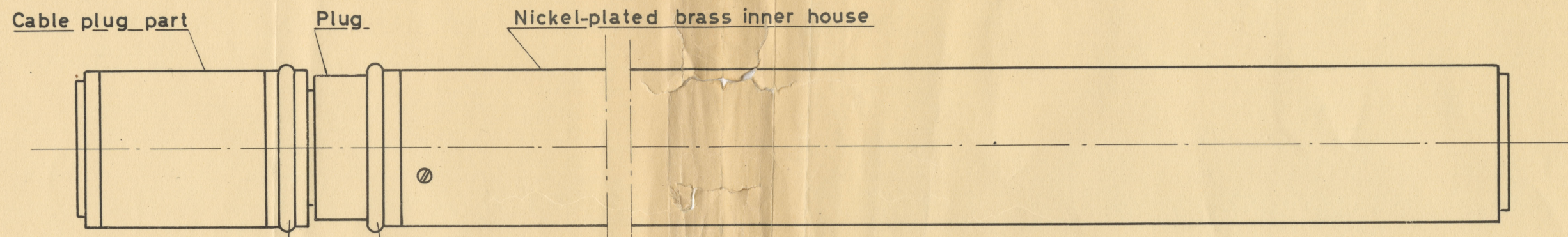
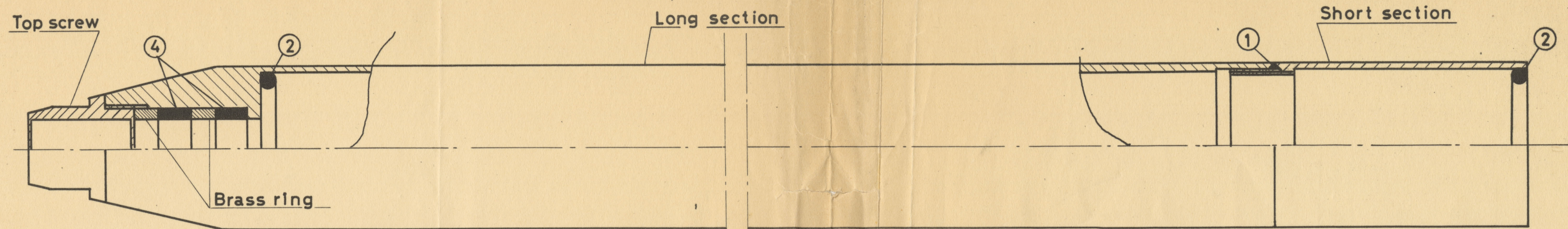
Removal of Cable and Plugpart from Detectorhouse.

1. The conical top screw on the detector housing is unscrewed by a 17 mm key and pushed 25 cm along the cable.
2. The two brass rings and the two teight pressed rubber packings around the cable inside the conical part can be removed by carefully pushing and pulling the cable.
Apply some alcohol to reduce friction.
Push the four rings 25 cm along the cable.
3. Hold on the steel house and push in the cable. Hereby you will push out the plugpart to which the cable is connected.

Mounting of Cable with Plugpart in Detectorhouse.

1. Mount cable in the plug part.
2. Check that the O-ring inside the detectorhouse and near the conical part is in position.
3. Push the cable through the detectorhouse. Place an O-ring in the groove in the plug part, before pulling the plug part into the detectorhouse.
For reduced friction between the O-ring and detectorhouse apply some silicone grease to the O-ring.
4. Place first one rubber ring, one brass ring, one rubber ring and one brass ring on the cable and slide the assembly into the conical part.
The conical top screw is screwed completely home. Mount plug in the other end of the cable.

STAINLESS STEEL DETECTOR HOUSE



RUBBER RINGS:

1 Gaco "O" R2137 - P90

2 Gaco "O" R4112-P60

3 Gaco "O" R4106-P60

4 Neopren NSC No. LK 024-J 0371

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