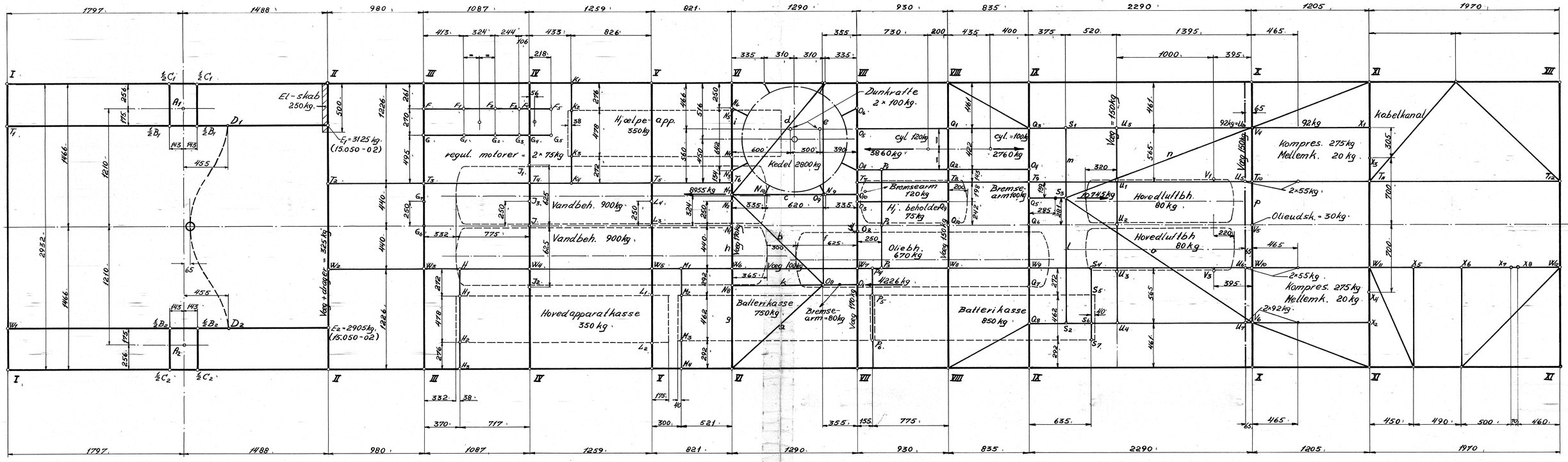
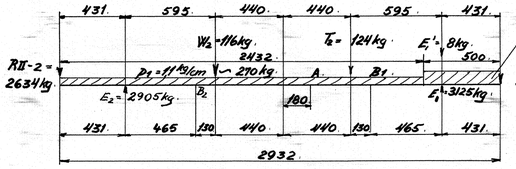


bl. 01.

1) Beregning af tværdrager II (mellem maskin- og bagagerum). Tegn 18W-15.100 pos. 2.



Efter 18W-15.050-02 er trykkene fra sekundære længdedragere $E_2 = \underline{2905\ kg}$ og $E_1 = \underline{3125\ kg}$. Egenvægt af drager og skillerum $75 + 250 = \underline{325\ kg}$.

$p_1 = \frac{325}{293{,}2} = \underline{1{,}1\ kg/cm}$. El-skab i maskinrum ca. 250 kg, fordelt over 500 mm $p_2 = 1{,}1 + \frac{250}{50} = \underline{6{,}1\ kg/cm}$ ∽ 305 kg. Kabelkanal med kabler mellem II og III vejer ca. $\frac{600 \times 98}{1800} = \underline{34\ kg}$ og giver meget nær $T_2 = E_1' \backsim \underline{8\ kg}$. Gulv og rist i bagagerum mellem II og III vejer ca. 140 kg. På II falder 70 kg, der giver $W_2 = T_2 = \frac{70 \times (440 + 1026 \times \frac{1}{2})}{2932}$ ∽ 23 kg. Bagage med 50% overlast: 1600 × 1,5 = 2400 kg, fordelt over 4115 mm. mellem II og III: $\frac{2400 \times 980}{4115} = \underline{570\ kg}$. $W_2 = T_2 = \frac{570\,(440 + \frac{1}{2} \times 1026)}{2 \times 2932} = \underline{93\ kg}$

Jalt $W_2 = 23 + 93 = \underline{116\ kg}$. $T_2 = 8 + 23 + 93 = \underline{124\ kg}$.

$E_1' = 8\ kg$. Tryk R_{II-1} og R_{II-2} bliver:

$$R_{II-1} = \frac{-270 \times 1216 - 305 \times 2682 - 116 \times 1026 - 124 \times 1906 - 8 \times 2501}{2932} + \frac{2905 \times 431 + 3125 \times 2501}{2932} =$$

$-112 - 279 - 41 - 81 - 7 + 427 + 2666 =$

$-520 + 3093 = \underline{2573\ kg.}$

bl. 02

$$R_{II-2} = \frac{-270 \times 1716 - 305 \times 250 - 116 \times 1906 - 124 \times 1026 - 8 \times 431}{2932} + \frac{2905 \times 2501 + 3125 \times 431}{2932} = -158 - 26 - 75 - 43 - 1 + 2478 + 459 =$$

$-303 + 2937 = \underline{2634\ kg}$

$M_{E\,zx} = -2634 \times 43{,}1 - 1{,}1 \times 43{,}1 \times 20{,}55 = -113100 - 1000 = \underline{-114100\ kgcm}$

Tværsnit ENP. 20 $W_x = 191\ cm^3$ $\sigma = \frac{114100}{191} = \underline{595\ kg/cm^2} < 800\ kg/cm^2$

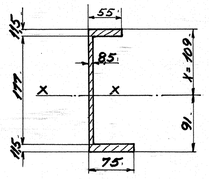
Q=0 i snit A-A ca. 180 mm fra midten.

$M_{x\,A} = -2634 \times 164{,}6 - 116 \times 62 - \frac{270 \times 1646 \times 823}{2432} + 2905 \times 121{,}5 =$

$-433000 - 7200 - 14100 + 353000 = \underline{-101300\ kgcm}$.

Profil [20. $\sigma_A = \frac{101300}{191} = \underline{530\ kg/cm^2} < 800\ kg/cm^2$

Snit B-B. (udskæring for remskive)*



$F = 5{,}5 \times 1{,}15 + 17{,}7 \times 0{,}85 + 7{,}5 \times 1{,}15 =$

$5{,}8 + 15{,}1 + 8{,}6 = 29{,}5\ cm^2$

$x = \frac{5{,}8 \times 0{,}57 + 15{,}1 \times 10 + 8{,}6 \times 19{,}42}{29{,}5} =$

$0{,}11 + 5{,}1 + 5{,}66 = 10{,}87 \backsim \underline{109\ mm}$

$J_x = \frac{1}{12} \times 5{,}5 \times 1{,}15^3 + 5{,}8 \times 10{,}32^2 +$

$\frac{1}{12} \times 17{,}7^3 \times 0{,}85 + 15{,}1 \times 0{,}9^2 + \frac{1}{12} \times 7{,}5 \times 1{,}15^3 + 8{,}6 \times 8{,}52^2 = 0{,}7 + 620 + 392$

$+ 12{,}4 + 0{,}9 + 628 = \underline{1654{,}0\ cm^4}$ $W_{x1} = \frac{1654}{10{,}9} = \underline{152\ cm^3}$

$M_{B1} = -2573 \times 89{,}6 - 305 \times 64{,}6 - 1{,}1 \times 39{,}6 \times 19{,}8 + 3125 \times 46{,}5 =$

$-231000 - 19800 - 900 + 145000 = \underline{-106700\ kgcm}$

$\sigma_1 = \frac{106700}{152} = \underline{704\ kg/cm^2} < 800\ kg/cm^2$

$M_{E1} = -2573 \times 43{,}1 - 6{,}1 \times 43{,}1 \times 21{,}5 = -111000 - 5700 = \underline{-116700\ kgcm}$

ENP. 20. $W_x = \underline{191\ cm^3}$

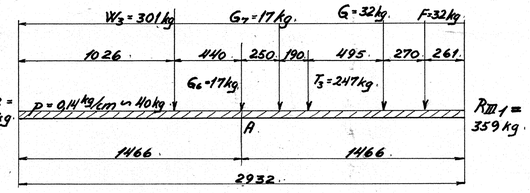
$\sigma_{E1} = \frac{116700}{191} = \underline{610\ kg/cm^2} < 800\ kg/cm^2$.

*er ikke udført.

bl. 03.

Tværdrager III ændret se tegn 18W-1.196

2) Beregning af tværdrager III (tegn. 18W-15.100 pos 3) $20 + 196 + 16 + 86 + 9 = \underline{327\ kg}$



Egenvægt af drager ca 40 kg $p = \frac{40}{293{,}2} = \underline{0{,}14\ kg/cm}$

Gulv i bagagerum vejer $\frac{140 \times \frac{1}{2}(980 + 1087)}{980} = \underline{148\ kg}$

$W_3 = T_3 = \frac{148 \times (440 + \frac{1}{2} \times 1026)}{2932} = \underline{48\ kg}$.

kabelkanal med ledninger vejer $\frac{600 \times \frac{1}{2}(980 + 1087)}{18000} =$ 34 kg, der fordeles i G_6 og G_7 med $G_6 = G_7 = \underline{17\ kg}$

Bagage: $\frac{2400 \times \frac{1}{2}(980 + 1087)}{4115} = 578\ kg$, der giver

$W_3 = T_3 = \frac{578 \times (440 + \frac{1}{2} \times 1026)}{2932} \backsim \underline{189\ kg}$

Gulvbærere: $T_3 = W_3 \backsim \underline{10\ kg}$. Reguleringsmotorer: $2 \times 75 = \underline{150\ kg}$. Bæring for do. $\underline{80\ kg}$.

$G = F = \frac{75 \times (512 - 56)}{2 \times 1087} + \frac{80 \times 434}{2 \times 1087} = 16 + 16 = \underline{32\ kg}$

Apparatkasse: Vægt 350 kg $H_1 = H_2 = \frac{350\,(\frac{1}{2} \times 2189 - 175)}{2 \times (717 + 1259)} = 82\ kg$

$H = \frac{82 \times (276 + 754)}{1026} = \underline{82\ kg}$ $W_3 = \frac{82 \times 717}{1087} = \underline{54\ kg}$

Jalt $W_3 = 48 + 189 + 10 + 54 = \underline{301\ kg}$ $G_6 = G_7 = \underline{17\ kg}$

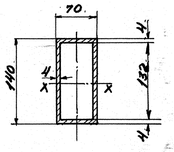
$T_3 = 48 + 189 + 10 = \underline{247\ kg}$ $G = F = \underline{32\ kg}$

$R_{III\,1} = \frac{1}{2} \times 40 + \frac{301 \times 1026 + 17 \times (1466 + 1716) + 247 \times 1906}{2932} + \frac{32 \times (2401 + 2671)}{2932} =$

$20 + 105 + 18 + 161 + 55 = \underline{359\ kg.}$

$R_{III\,2} = \frac{1}{2} \times 40 + \frac{301 \times 1906 + 17 \times (1466 + 1216) + 247 \times 1026}{2932} + \frac{32 \times (261 + 531)}{2932} =$

bl. 04.



Snit A-A:

$F = 7 \times 14 - 13{,}2 \times 6{,}2 = 98 - 82 = \underline{16\ cm^2}$.

$J_x = \frac{1}{12} \times 7 \times 14^3 - \frac{1}{12} \times 13{,}2^3 \times 6{,}2 = \underline{412{,}3\ cm^4}$.

$W_x = \frac{412{,}3}{7{,}0} = \underline{58{,}9\ cm^3}$

Q=0 i snit A-A.

$M_{AX} = 327 \times 146{,}6 - 20 \times 73{,}3 - 301 \times 44 = 48000 - 1500 - 13300 = \underline{33200\ kgcm}$

$\sigma_A = \frac{33200}{58{,}9} = \underline{575\ kg/cm^2} < 800\ kg/cm^2$

Fortsættes på tegn. 18W-1.191.

Stk.	Betegnelse	Pos.	Materiale kvalitet	Model nr. eller materiale størrelse	rå / færdig Vægt/stk.
5					
4					
3					
2					
1					

Tegn. E.U. 20-12-50 Rev. 22-2/51 E.U. Afd. II.L.
Kalk. Norm. Dato
Dato Rettelse Indeks

Målestok:

FRICHS

Anvendelse: Diesel-el. 500/550 HK. motorvogn.

Stykliste nr.: —

Tegningens benævnelse: Beregning af dragere i undervogn.

Tegningens nummer: 18W – 1.190.

Indeks:

FRICHS nr. 147