

Haulotte 
GROUP
HA 41 PX



PARTIE HYDRAULIQUE
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1- Main differences with HA32PX

- Nominal load is 230kg , slope sensor 4 °
- All hydraulic unions are in ORFS (O-Ring Face Seal)
- Cage rotation is changed (rotative cylinder and overload system driven by angle transmitters and pressure sensors on jib cylinder)
- On HA41PX there is internal faults detection devices , made by 3 lights indicators which advise the operator the reason of the possible failure :
 - 1- red light with flash sequence (see instructions manuals)
 - 2- red overload light
 - 3- orange light for radius limiter
- Load system similar to HA260PX (A1 potentiometer angle survey , G1 and G2 pressure sensors on jib cylinder in order to measure the pressure in the 2 jib cylinder chamber (Big and small) and A2 inclinometer in order to measure the angle of the link part with machine gravity and also command the cage levelling system (+/- 10°)
- in emergency mode , all speed parameters are set at 100% in order to save energy and battery in order to prevent the electrical motor overheating.

Some basic functions (see diagram below)

- Compensation part lifting with constant radius : from 0 to 60° primary boom lifting only , and from 60° to 78° , the compensation part lift vertically with an automatic monitoring process (lift and telescopic lifting at the same time)
- the main boom has a radius limitation similar to the HA260PX(automatic return of the telescopic boom when in outreach limitation when the operator wants to lower the main boom (orange light flashing in both control box), the main boom radius limitation is independant of the primary boom position .
- When the primary boom is lower than 60° , the main boom descent is forbidden under 0° (orange light ON) ,if there is a risk of mechanical interference between the 2 booms, the main boom lift is limited at 48° maxi for the rear stability of the system (orange light is ON).
- The drive is cut at maximum outreach limitation.
- The movements are slowing down before reaching the maximum position (around 15cm before), the speed is reduced and acceleration is cut.

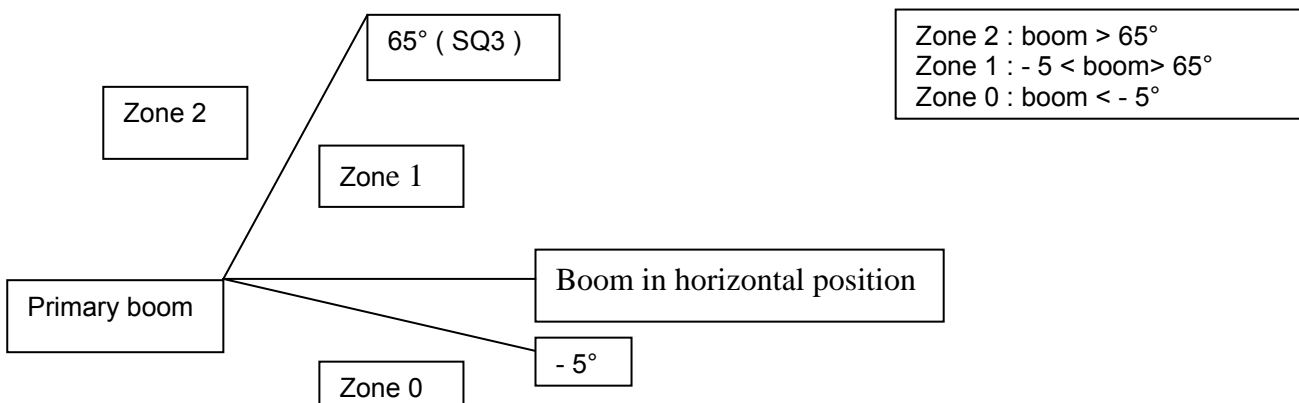
Restrictive mode explanation

- If one of the transmitters (SL type) is not working or there is no corresponding values between each other , some functions are lost in order to prevent dangerous movements (the normal limit switches such SQ type manage the position of the elements),

In this case , the system oblige the operator to :

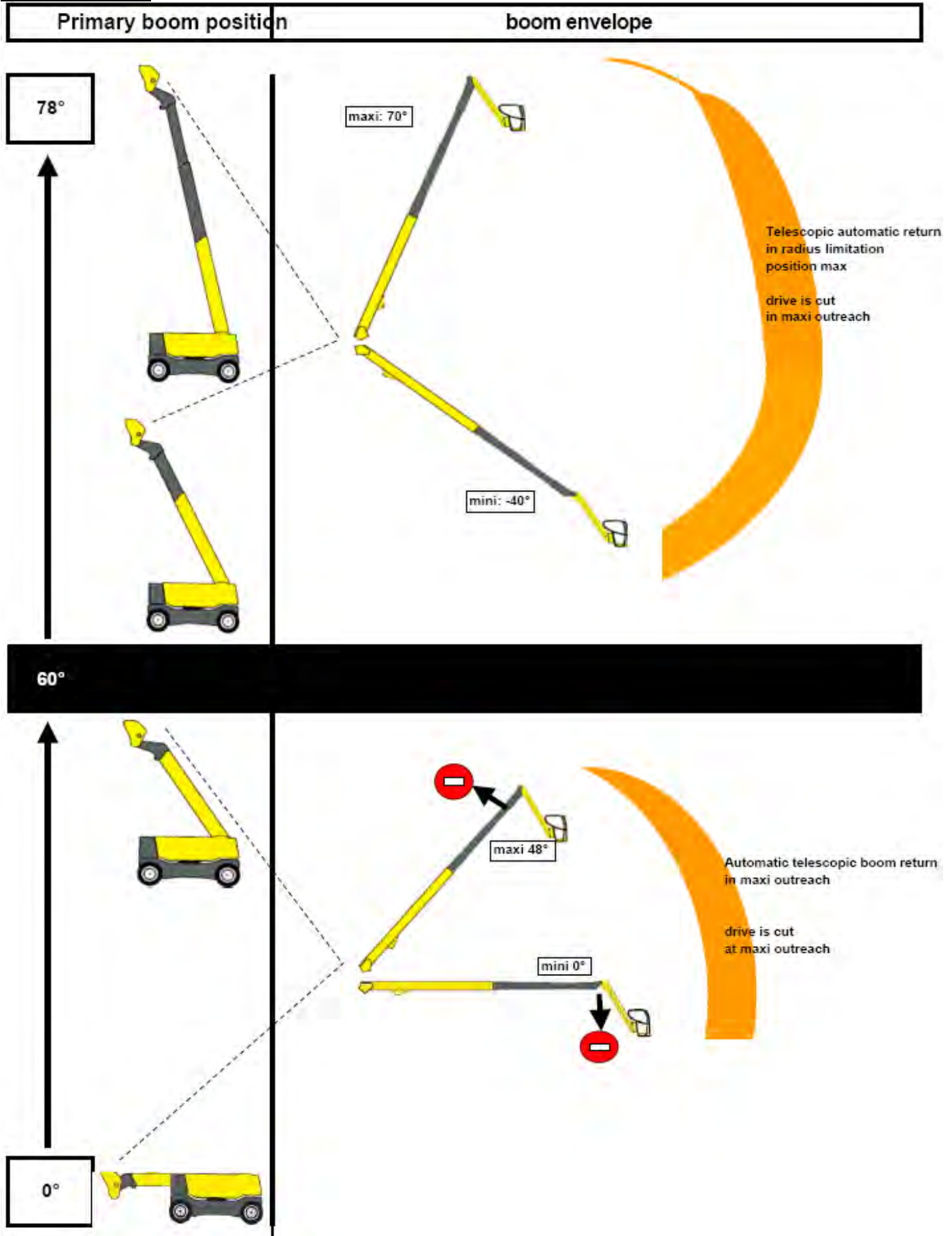
- Lower the boom in order to reach the boom in area 1 (managed by SQ3)
- Retract completely the telescopic boom (SQ9)
- Retract completely the primary telescopic boom (SQ10)
- Lower the primary boom (SQ11)
- In overload , all :movements are cut from upper control box and from turret, the movements are allowed (beware the main boom should be above the horizontal line in order to be able to lower the primary boom)

Evolution area of telescopic primary boom (restrictive mode)



- Zone 0 : boom lift allowed but primary boom descent forbidden if telescopic boom retracted
- Zone 1 : boom lift and descent possible if telescopic boom is retracted (SQ3=open)
- Zone 0 et 1 : telescopic boom exit (radius limitation) in restrictive mode
- Zone 2 : boom descent are possible (whatever the telescopic boom position is)

Normal function :



Primary boom :

-the primary boom has one more element compared to the HA32PX, the telescopic elements are getting out in synchronous way (the 1st element the 2nd one before the 1st has reached the maxi position in order to have a better smoothness in the movement : same way for the descent)

The primary boom is equipped of a coarse detection in order to permit the boom radius limiter monitoring process.

-the primary boom descent is possible only when primary telescopic boom is retracted and main boom near the horizontal line.

-Compensation part lift (restrictive mode)

In normal function, we must have the synchronised movements (lift then telescopic)

The inside element is telescoped with an extra cylinder locate outside the primary booms and attached to the intermediate plate(see hydraulic drawing Cyl 3 (primary boom maxi angle is 78°)

-Primary telescopic boom only : the return will automatically command the main boom telescopic retraction when in outreach limitation.

Evolution area (primary and main booms)

The primary boom can be lifted alone up to 60°, then the telescopic boom in synchronised movements up to 78° (maxi position).

Main boom :

-the main boom is equipped with an radius limiter device according to the telescopic boom coarse and boom angle and also primary telescopic boom coarse .

-The main boom lift alone is possible only when the primary boom is in higher position,

- the boom descent below the horizontal line is authorised only if primary boom is above 60° (but the primary boom could be lower than 60° if main boom is lower than horizontal)

When lowering and in outreach limitation (above horizontal), the telescopic re-entry is automatic and produce at the same time a vertical movement from cage in order to avoid the discomfort of cutting movement when radius limitation is reached (orange light ON)

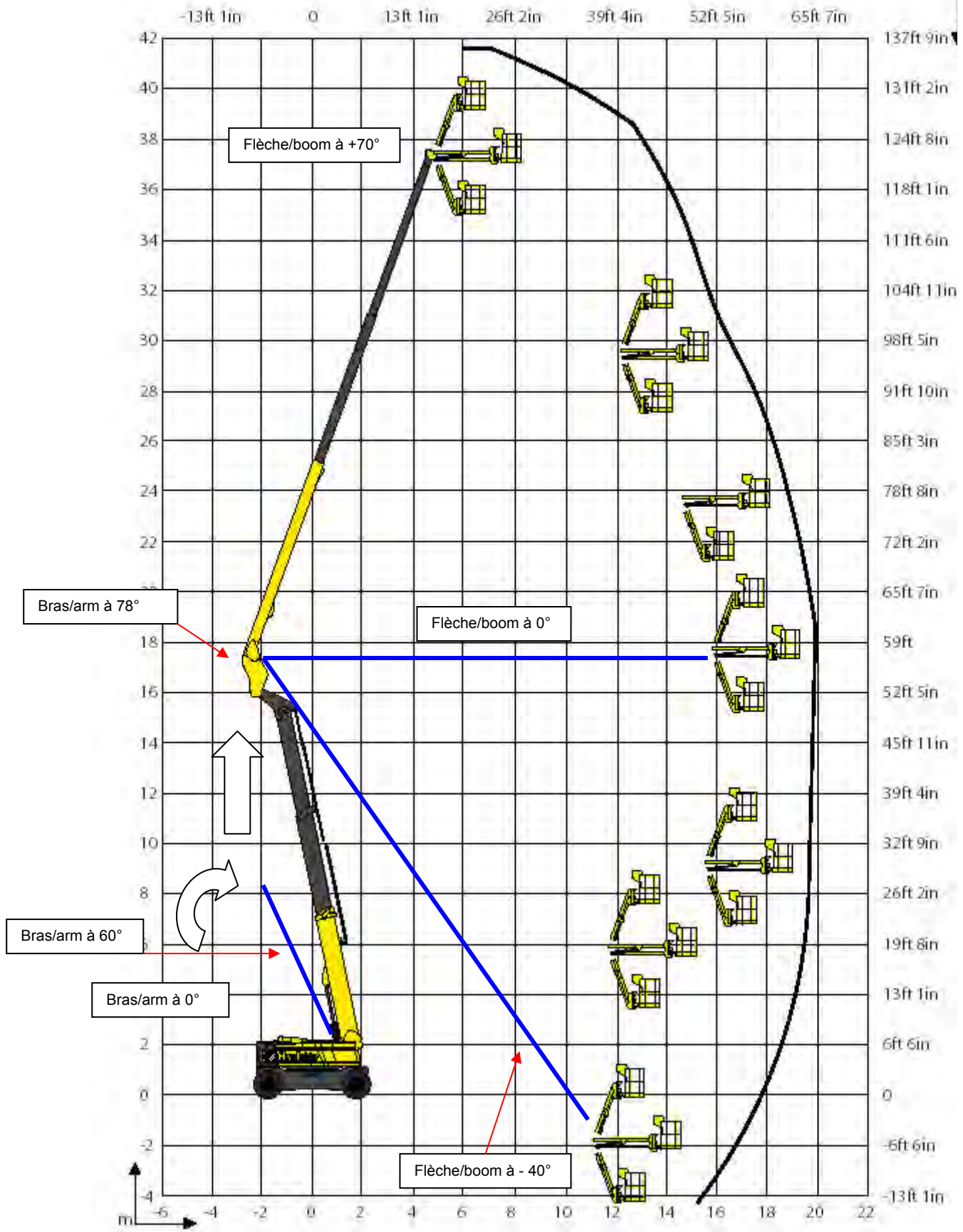
Ex if the boom is above horizontal and primary boom lower than 60°, boom descent is possible but in order to lower completely the primary boom ,the main boom must be lifted before (reminder that boom descent is possible up to – 40° ; see position III of calibration)

Boom range enveloppe :

If primary boom is lower than 60° ,the boom is in reduced working area (from 0 up to 50° maxi)

If boom is above than 50° when primary boom is above 60° , the primary boom descent is possible up to 60° then the boom will down in automatic up to the 50° described previously..

2-Diagramme de charge- working envelope

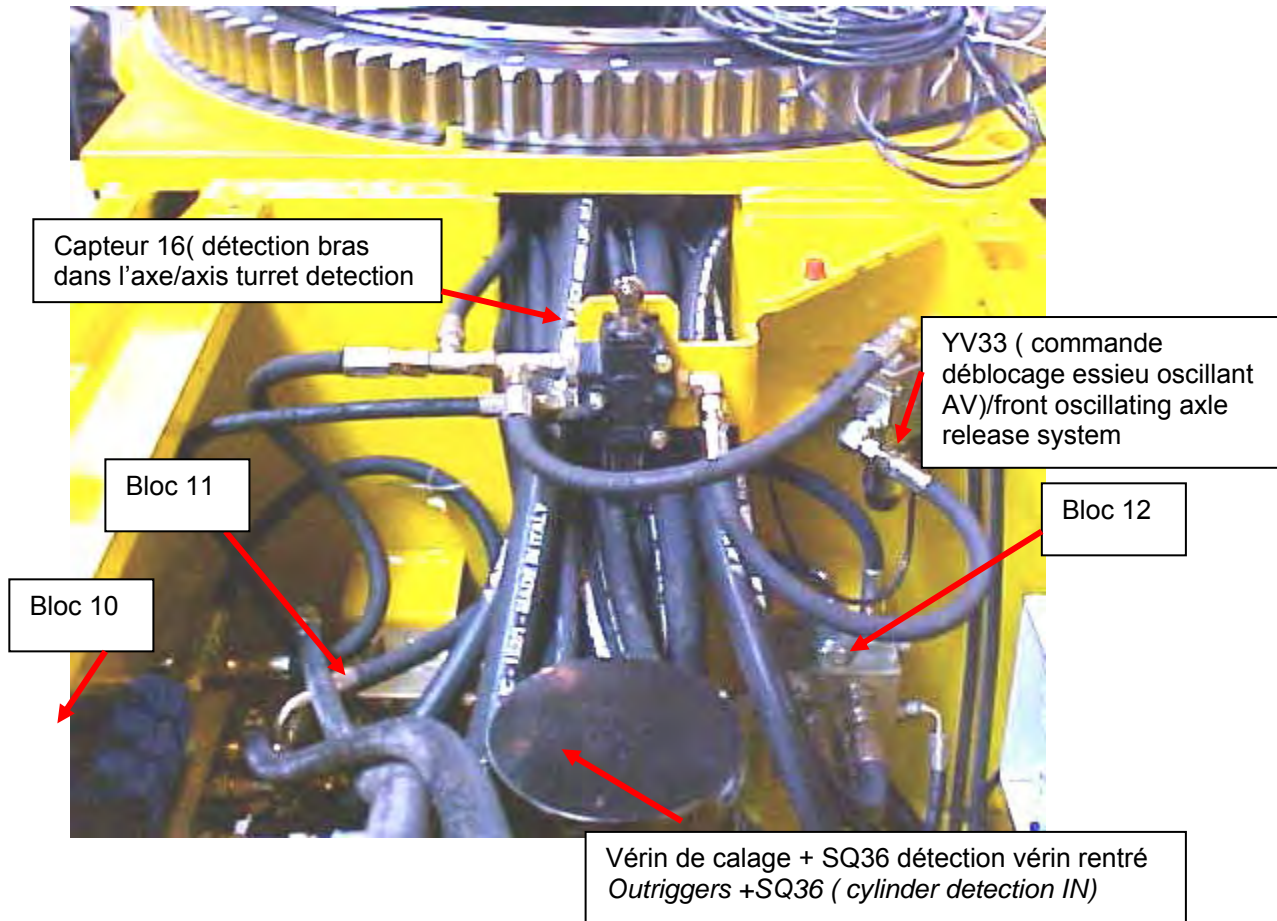


PARTIE HYDRAULIQUE

Voir plan hydraulique 159P252360(3 feuilles + 1 nomenclature)

See hydraulic drawing 159P252360 (3 sheets + nomenclature)

3-Châssis partie AV / lower chassis front side



Les blocs hydrauliques du châssis / Hydraulic block on frame

Bloc 10 : Bloc de pilotage de translation – *drive bloc control*-rep 10- 242 021 1110

Bloc 11 : Bloc de translation 2 diviseurs – *drive block with 2 flow dividers*-rep 11- 242 021 1100

Bloc 12 : Bloc de translation 1 diviseur , *drive block with 1 flow divider* -rep 12- 242 021 1090

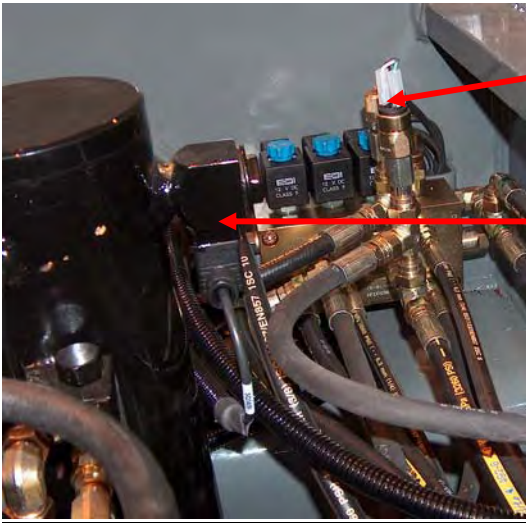
Bloc 13 : Distributeur parallèle 4 éléments , *4 hydraulic element in parallel* -rep 13- 242 690 4040

Bloc 14 : Bloc de défreinage / direction- *steering and brake release bloc* -rep 14- 242 021 1180

Capteurs hydrauliques à galet – *hydraulic captor with roller* rep 16- 2426904060

Joint tournant – *slip ring* -rep 18- 2421003080

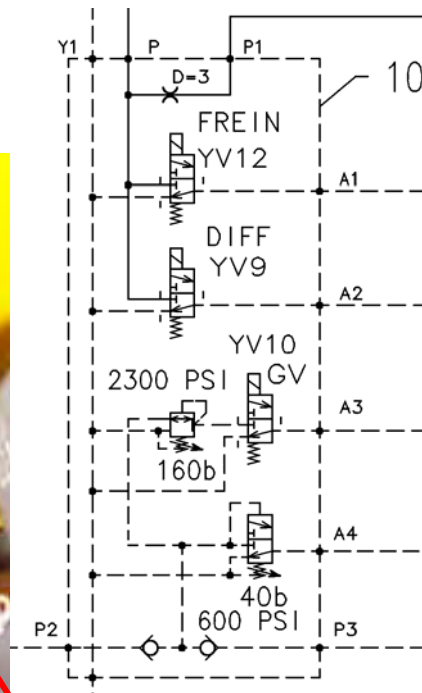
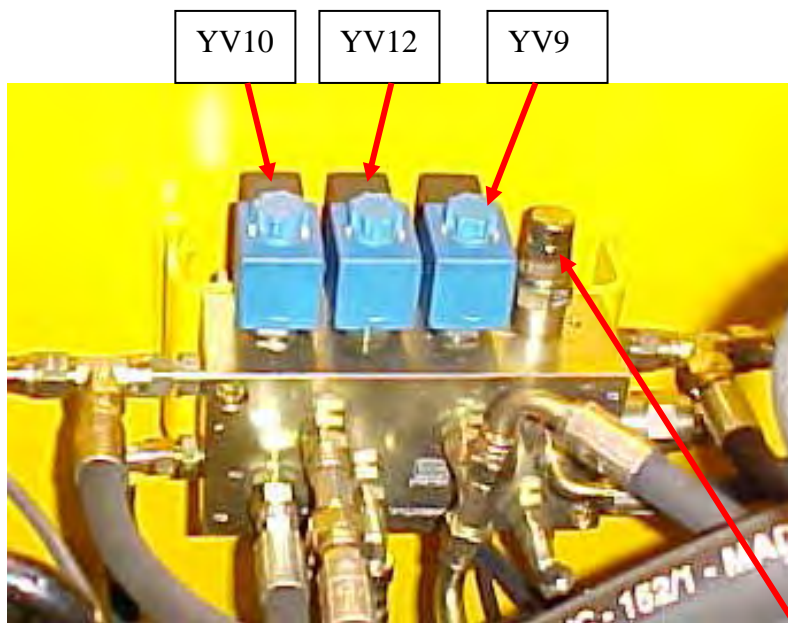
4- Chassis partie AR- rear part of the chassis



Mano B8 (pressostat GV)/
pressure limiter for High Speed (
pièce rep 45)

Vérin de calage +SQ35 (détection calage AR
rentré)
*Outrigger+SQ35 detection rear outrigger cylinder
retracted*

Bloc 10 : Bloc de pilotage de translation / Block of drive control



Charge maximale / *Max load* : 10L/min/ pmax 320bars

YV12 : commande les freins / *brakes control*

YV9 : commande le différentiel / *differential control*

YV10 : commande la Grande Vitesse / *high speed control*

Sortie A4 : valve de séquence pour déblocage essieu oscillant vers capteur hydraulique bras rentré rep 16 / *sequence valve for oscillating axle release operation towards hydraulic captor of primary boom down*

Pièce 45 : capteur de pression manoccontact B8 10bar/ Pressure switch B8 10 bars (repère 45)

Le capteur de pression monté sur la ligne de pilotage des freins sert uniquement pour la grande vitesse (si déconnecté , on reste en PV (+12VDC)

Au dessus de 3M , la GV est théoriquement interdite (seule PV est autorisée), c'est pourquoi si l'opérateur demande néanmoins de la GV , le manoccontact limitera la pression à 10 bars et la machine restera en PV

The pressure sensor mounted on brakes command line is only for High Speed (if disconnected ,the system remains in Low Speed)

Above 3meters, the High speed is theoretically forbidden (only Low Speed) is authorised , that's why when the operator is asking anyway the HS the pressure switch will limit the pressure at 10bars and the boom will remain in LS drive .

5-Bloc 11 : Bloc de translation double 2 diviseurs / Block of 2 divider drive(2420211100)

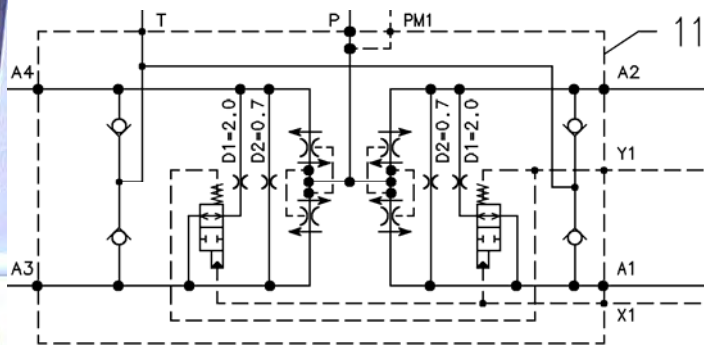
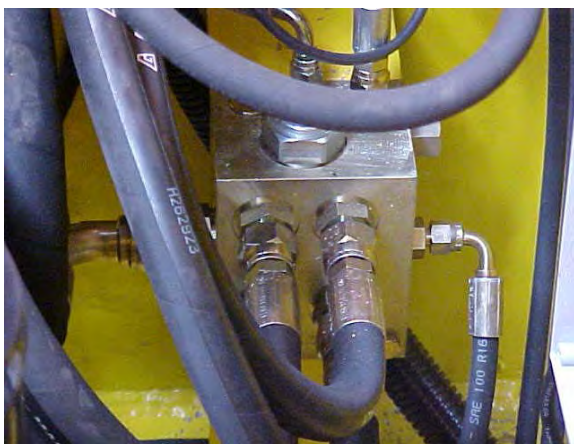
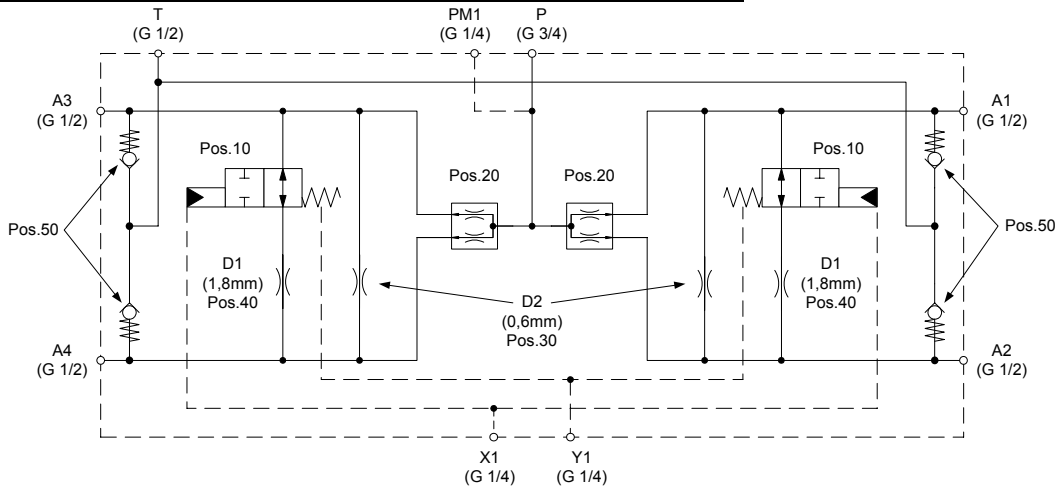


photo 3- Bloc de translation 2 diviseurs / Block of 2 divider drive



Caractéristiques :

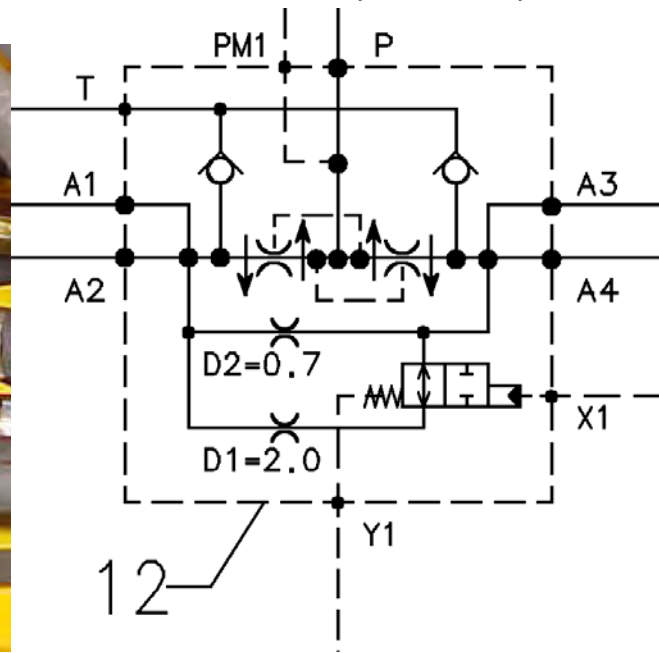
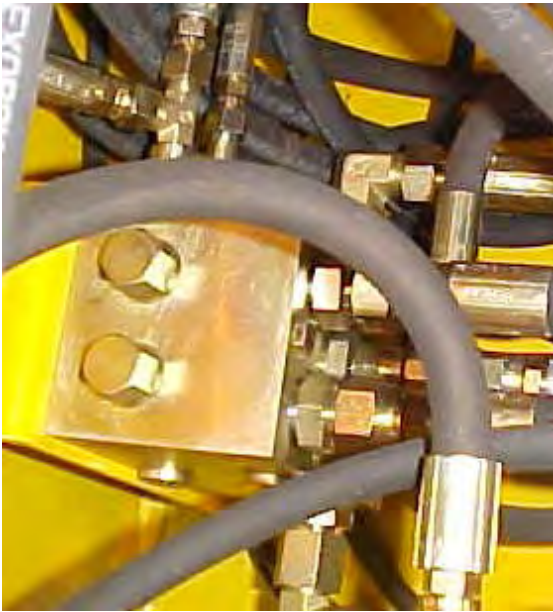
Pression maxi / Max pressure : 320 b

Débit maxi à l'entrée/ max input flow : 116l/min

Diamètre des gicleurs / spray nozzle D1 : 1.8 MM

Diamètre des gicleurs / spray nozzle D2 : 0.6 MM

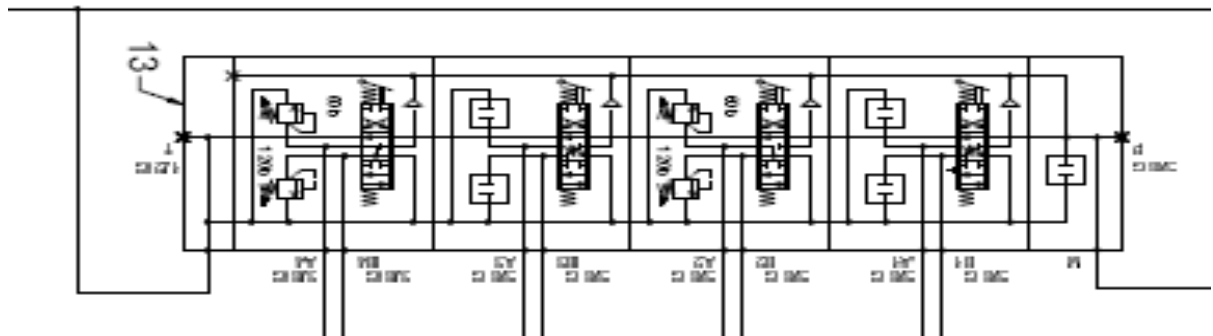
Bloc 12 : Bloc de translation simple 1 diviseur / Block of 1 divider drive(2420211090)



Bloc de translation 1 diviseurs / Block of 1 divider drive

- P → joint tournant 2 (rep 18) / to slip ring
- A1, A2 → roues AR (rep 4) / to the rear wheels
- A3, A4 → roues AVR (rep 4) / to the front wheels

6-Pièce 13 Distributeur parallèle 4 éléments / Electro valve 4 elements (2505000110)



Distributeurs parallèles / *Electro valve on parallel*

Il est monté verticalement , il conserve le même système de fonctionnement que la HA32PX (on abaisse le levier pour descendre le calage et faire monter le chassis) ,

It's mounted vertically , the system is the same as for HA32PX (we lower the lever in order to lift the chassis)

7-Bloc 14 : Bloc de direction et défreinage/ Steering and brake release bloc (ref 2503000530)

AV → freins des roues AV / *to front wheels brakes*

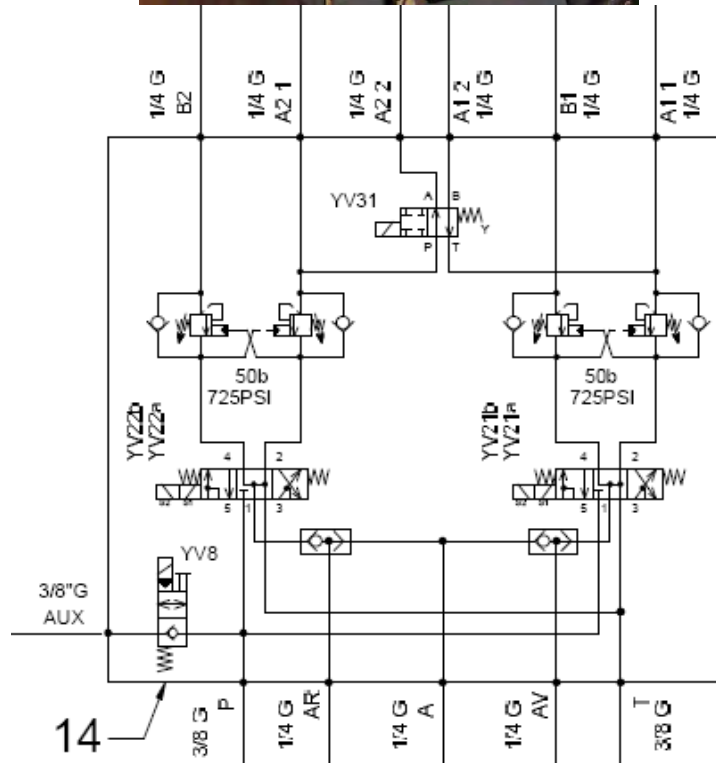
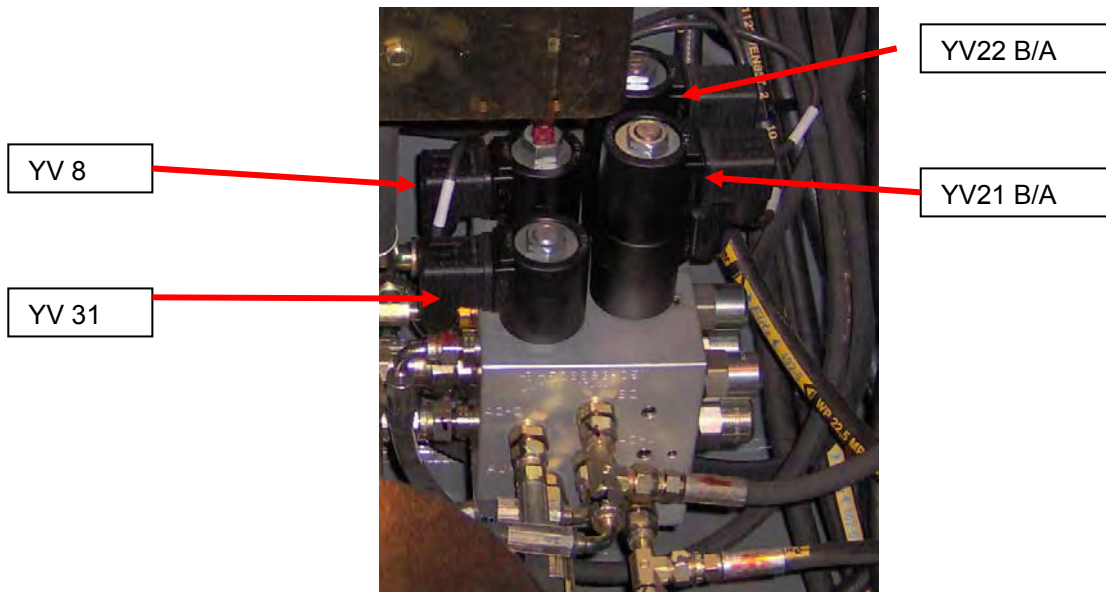
AR → freins des roues AR / *to rear wheels brakes*

YV21 : commande la direction AV / *control the front steering*

YV22 : commande la direction AR / *control the rear steering*

YV31 : maintient la direction pendant les entrées/sorties des essieux / *hold the steering during axles movements (extension or retraction) (Attention dans chassis machine , cable repéré YV32)*

YV8 : Sélection calage – extension / *selection outriggers- axles extension*

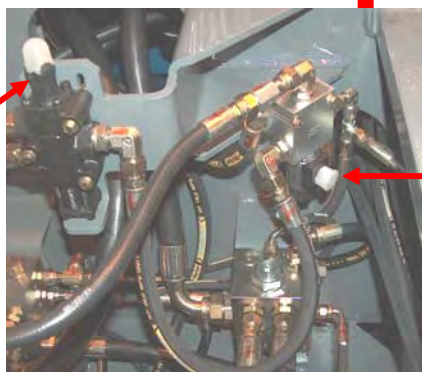
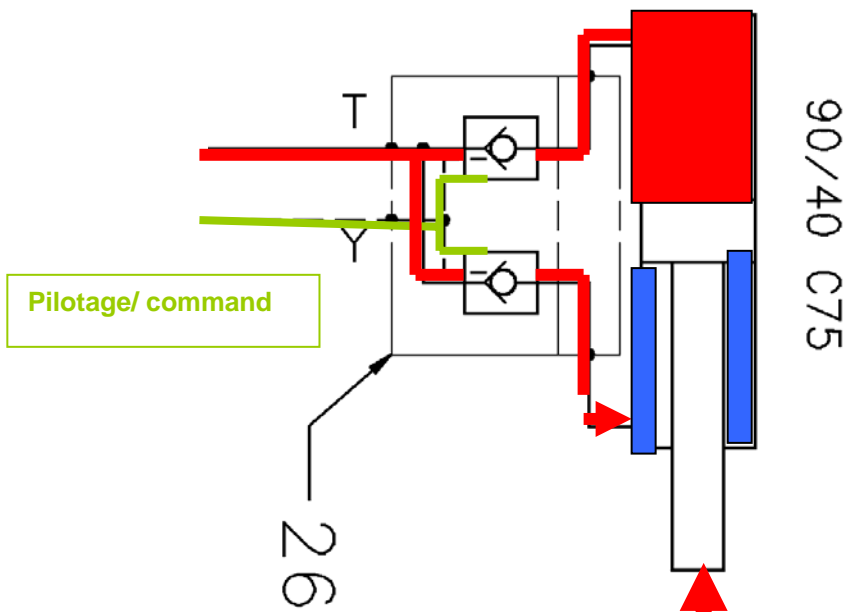
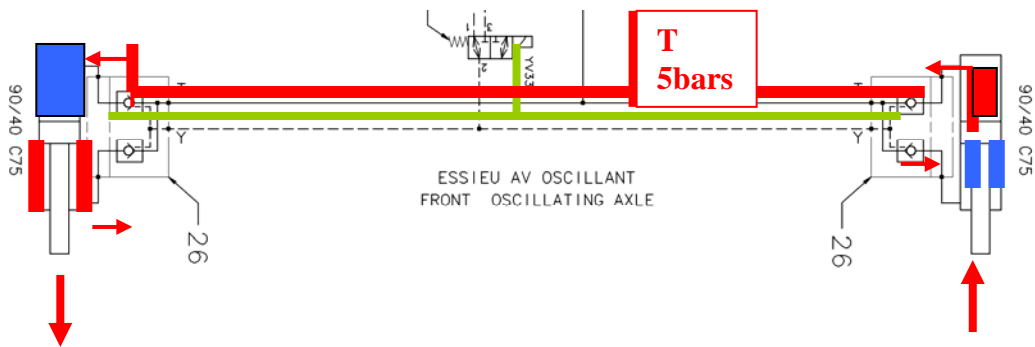


8-Le système de blocage des essieux oscillants/ lock system on oscillating axles

Pièce n° 49 -électro valve YV33 / Solenoid valve yv33

YV33 : commande l'essieu AV oscillant, 2 → bloc clapet anti-retour (rep 26)
 YV33 front oscillating axle command , 2 with check valve (Rep 26)

L'essieu oscillant (donc les deux vérins de blocage) se débloquent que lors de la translation GV via YV33 , sinon pas de pression en ligne et si la tourelle est axée (capteur hydraulique rep 16)
 The oscillating axle (the two cylinders) will be unlocked only during driving mode (High Speed) through YV33 (if not no pressure on line) and if the turret is aligned (with hydraulic switch rep 16)



Capteur tourelle axée (pièce 16)
 Hyd switch for turret aligned
 (part 16)

YV33

9-Moteur Perkins (engine)

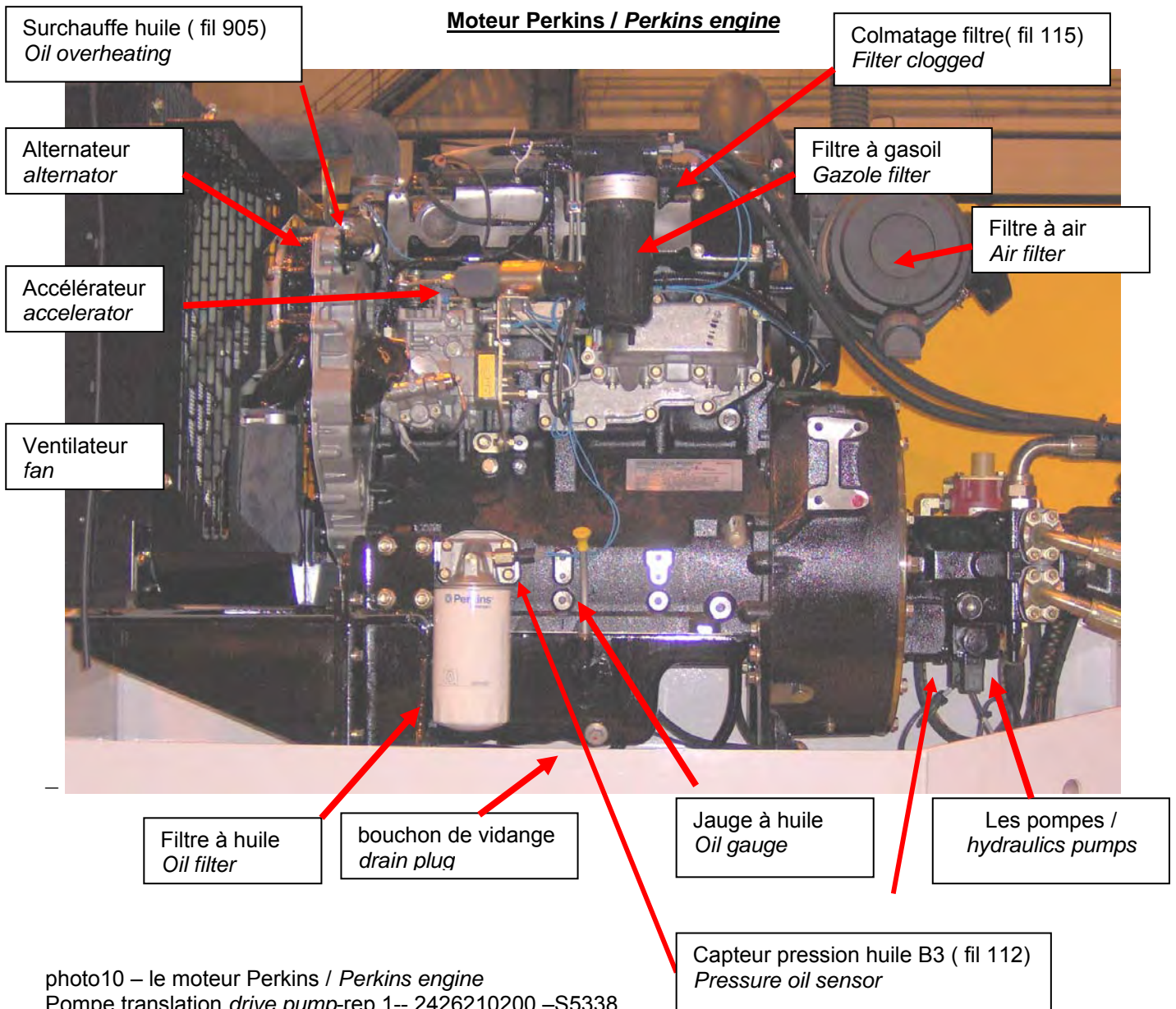


photo10 – le moteur Perkins / Perkins engine

Pompe translation *drive pump*-rep 1-- 2426210200 –S5338

Pompe équipement-*equipemnt pump*-rep 2- 2426210190

Groupe de secours –*emergency pump* rep3- 2440704120

Distributeur équipement PVG32 –*proportional valves* rep 8 –2426904100 -S5691

Distributeur panier (3 tranches) – *cage valve* rep 9- 2420212300

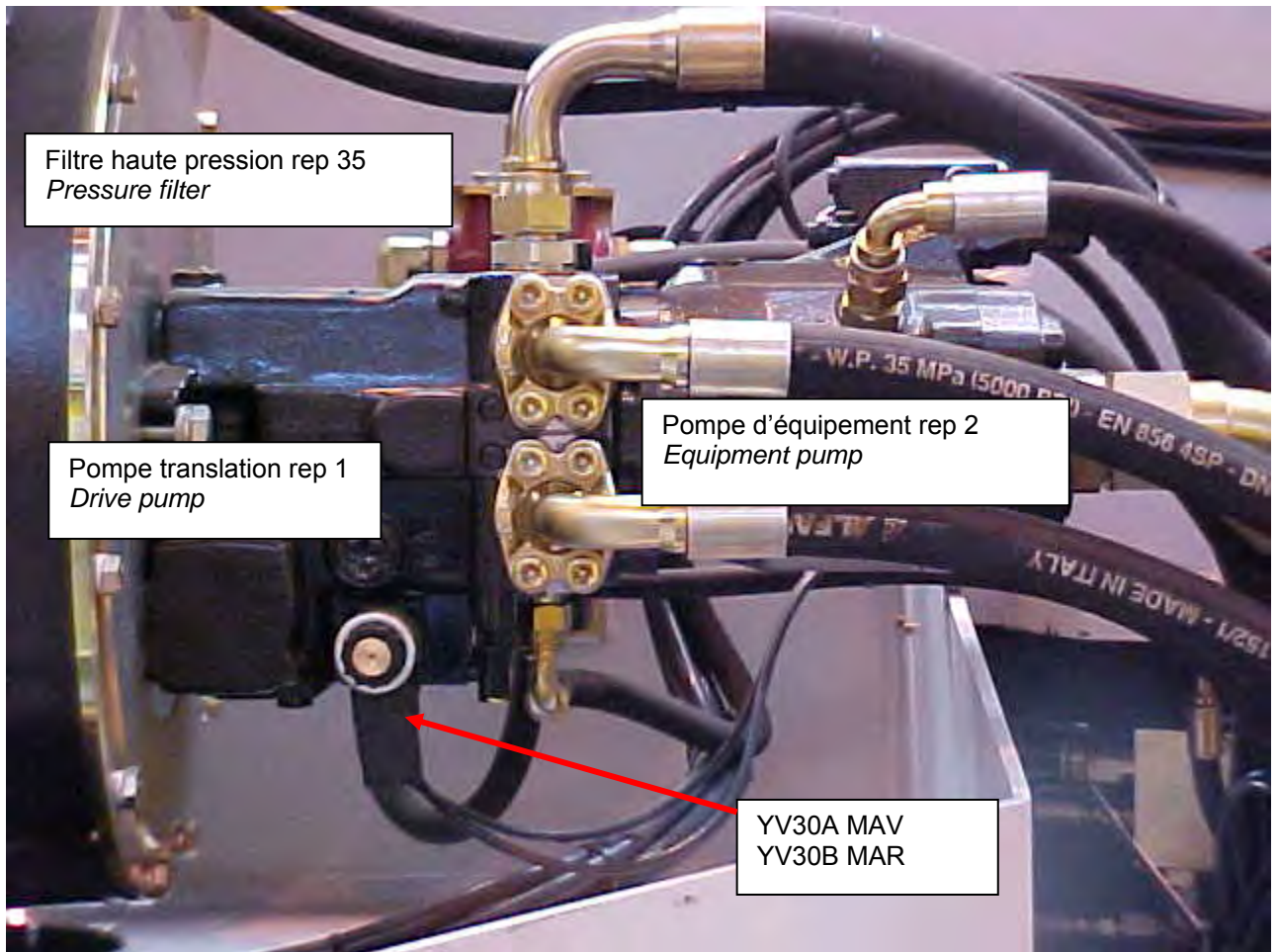
Capacité _ *capacity*

Volume d'eau de refroidissement- *cooling water volume* : 16.9l

Volume d'huile – *oil volume*: 5.6 à 6.9l

Pour la vidange – *for drain* : 7l (+1.5l pour le remplissage- *fill up*)

10-Pompes - Pumps



Pompe translation / Drive pump

Commande électrique proportionnel 12 V / linear electrical control 12V

Avec annulation de débit / with flowrate cancellation

Avec limiteurs HP sans by pass réglables de 250 à 340 b / with HP limiters without adjustable by-pass

Pompe de gavage : 8.4 cm³ / dump pump

Orifices à brides SAE 3/4" 6000 PSI

Filtration sur le refoulement de la pompe de gavage

PTO pour montage d'une pompe A10VO 45 DFR/52 R PUC 64 NOO3

Valeurs de réglage / setting values :

Dp de dimensionnement de la translation : 300 bars (points A et B)

Valeur de tarage annulation de débit : 320 bars

Valeur de tarage limiteurs HP : P max = 350 bars

Valeur de tarage pression de gavage = 25 bars

Fonctions réalisées par ce bloc :

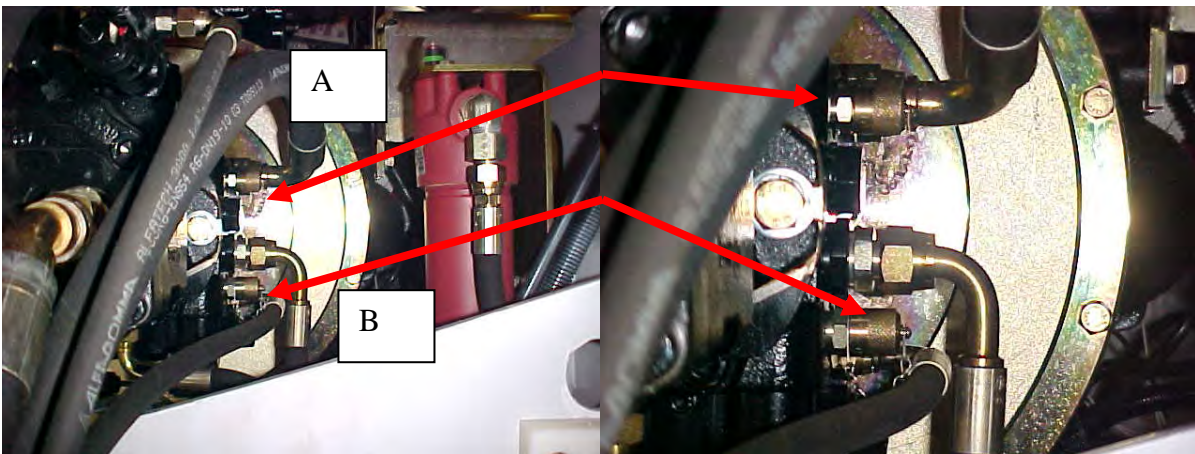
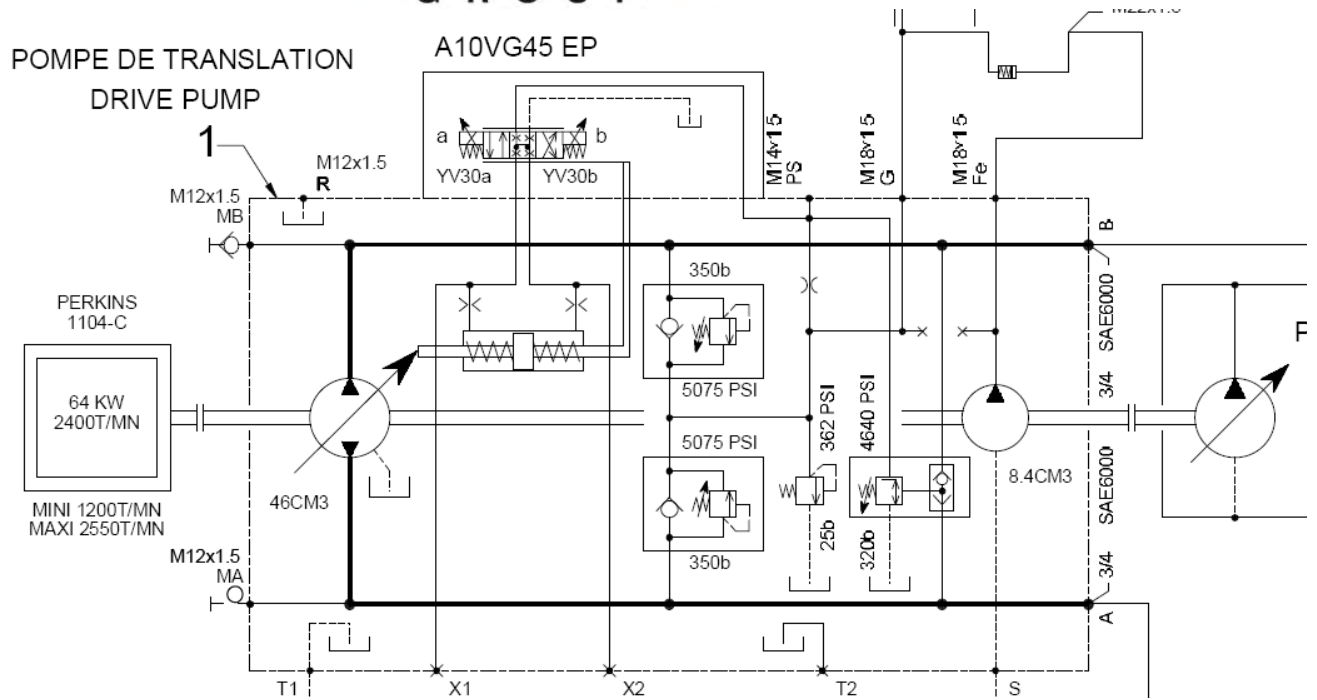
Répartition du débit entre essieux et roues

Dé-freinage des 4 réducteurs

Blocage de différentiel

Changement de cylindrée des moteurs (GV petite cylindrée 15cm³ PV grande cylindrée 46 cm³)

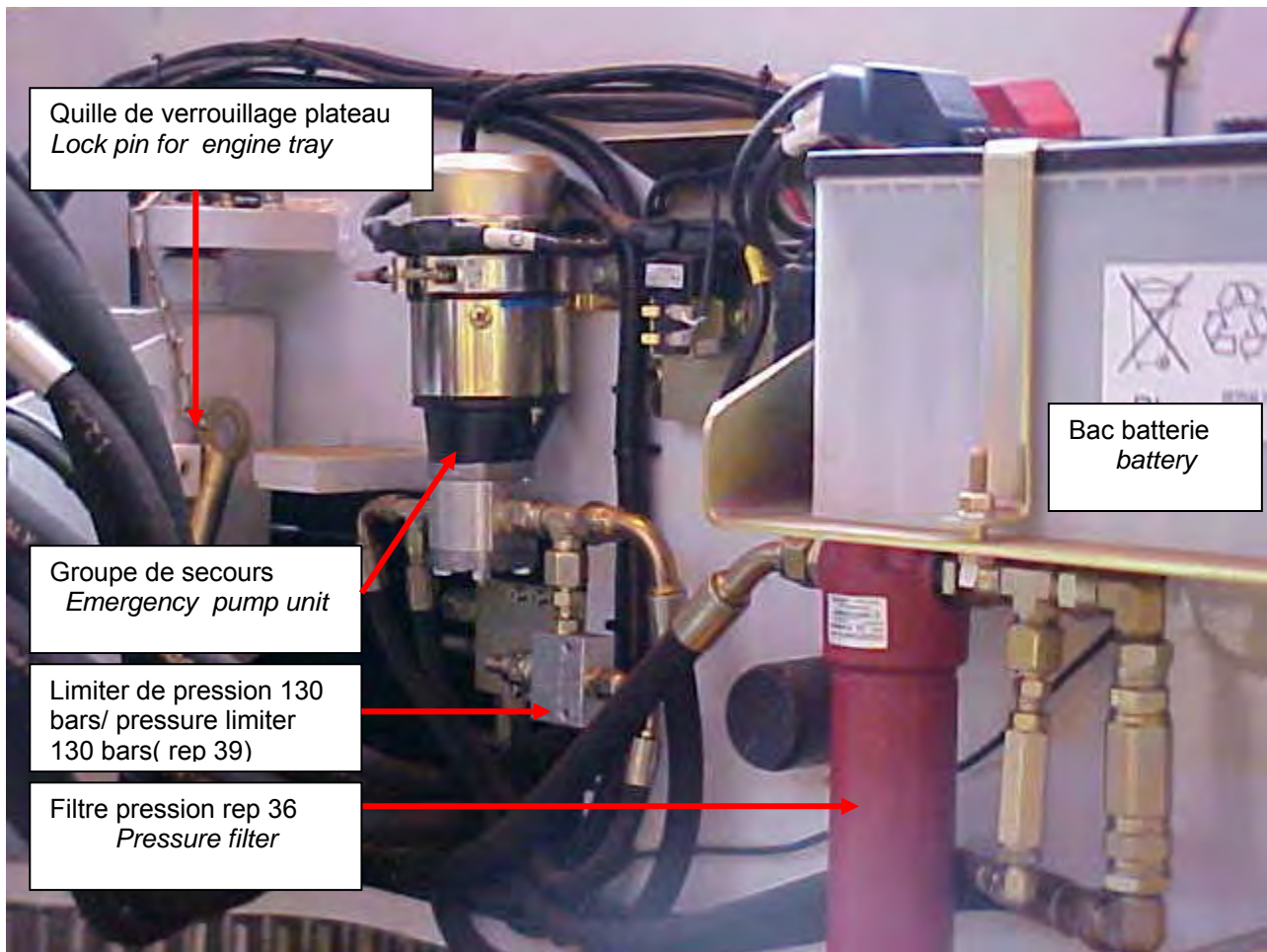
Activation du déblocage de l'essieu oscillant AV



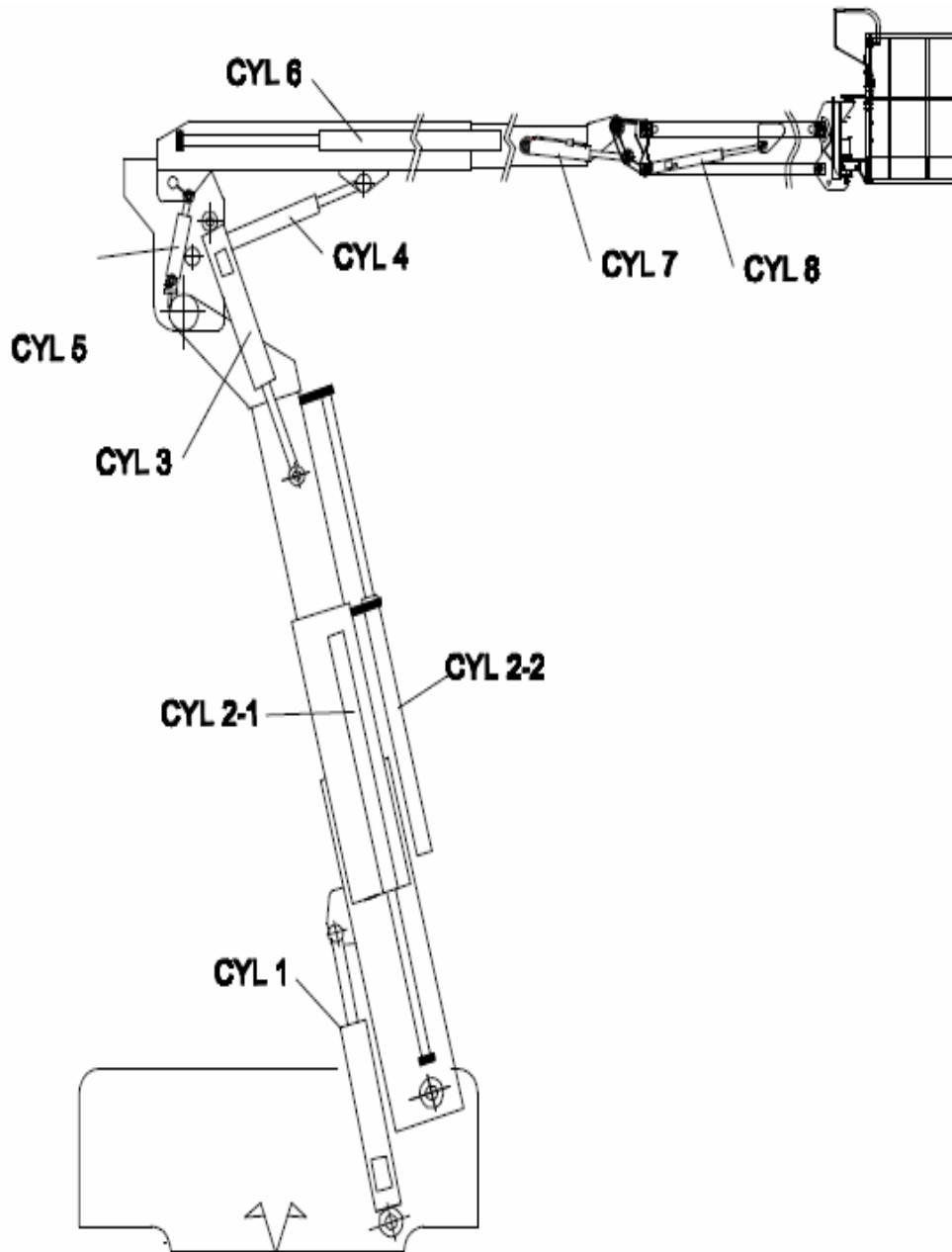
Points de réglage et de lecture de la pompe de translation/ setting and reading pressure on driving pump

- A : réglage MAV , FWD drive(300 bars)
- B : Réglage MAR , REV drive (300 bars)

11-Groupe de secours / *Emergency pump*

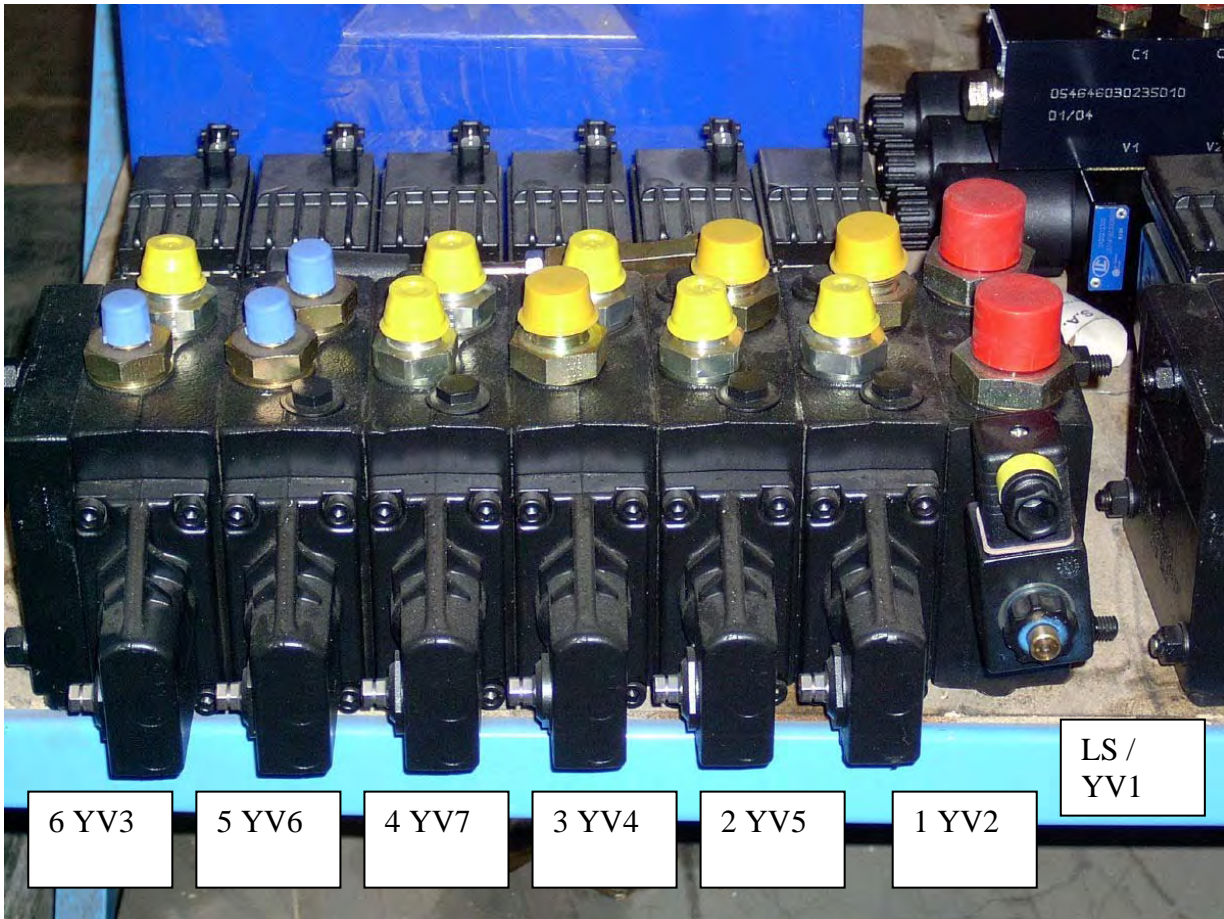
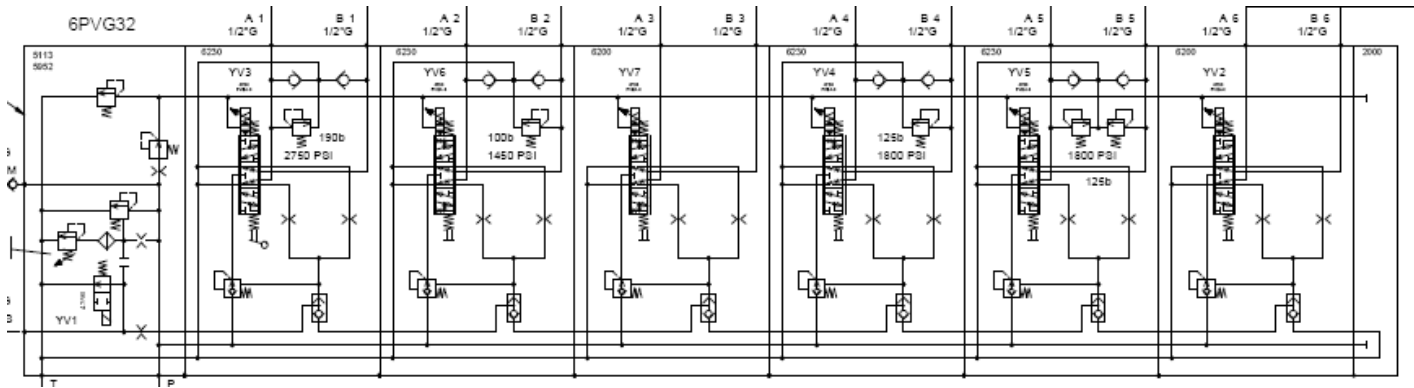


12-Cinématique levage bras et flèche / boom kinematic:



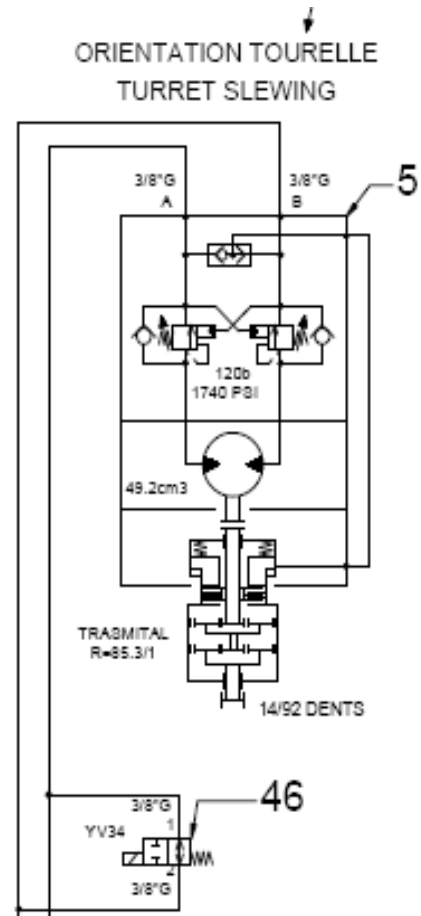
- Cyl 1 : vérin levage bras/primary boom lift cylinder
 Cyl 2.1 : vérin télescopage bras 1/ telescopic primary boom I cylinder
 Cyl 2.2 : vérin télescopage bras 2/ telescopic primary boom II cylinder
 Cyl 3 : vérin compensation pièce intermédiaire / intermediate part cylinder
 Cyl 4 : vérin relevage flèche / main boom cylinder
 Cyl 5 : vérin émetteur compensation / master levelling cylinder
 Cyl 6 : vérin télescopage flèche / main telescopic boom cylinder
 Cyl 7 : vérin récepteur compensation / slave levelling cylinder
 Cyl 8 : vérin pendulaire/ jib cylinder

13-Distributeur équipement PVG32 / proportional valves unit PVG32



- 1- YV2 pendulaire+ compensation +rotation panier / jib + cage levelling and rotation
- 2- YV5 orientation tourelle / turret rotation
- 3- YV4 relevage fleche / main boom lift
- 4- YV7 télescopage fleche / main telescopic boom
- 5- YV6 télescopage bras I et II / primary telescopic boom section I and II(arm)
- 6- YV3 levage bras + compensation pièce intermédiaire / primary boom lift + intermediate part lift

14-Moteur orientation tourelle freinée / turret rotation motor with brakes (part 46 : YV34)



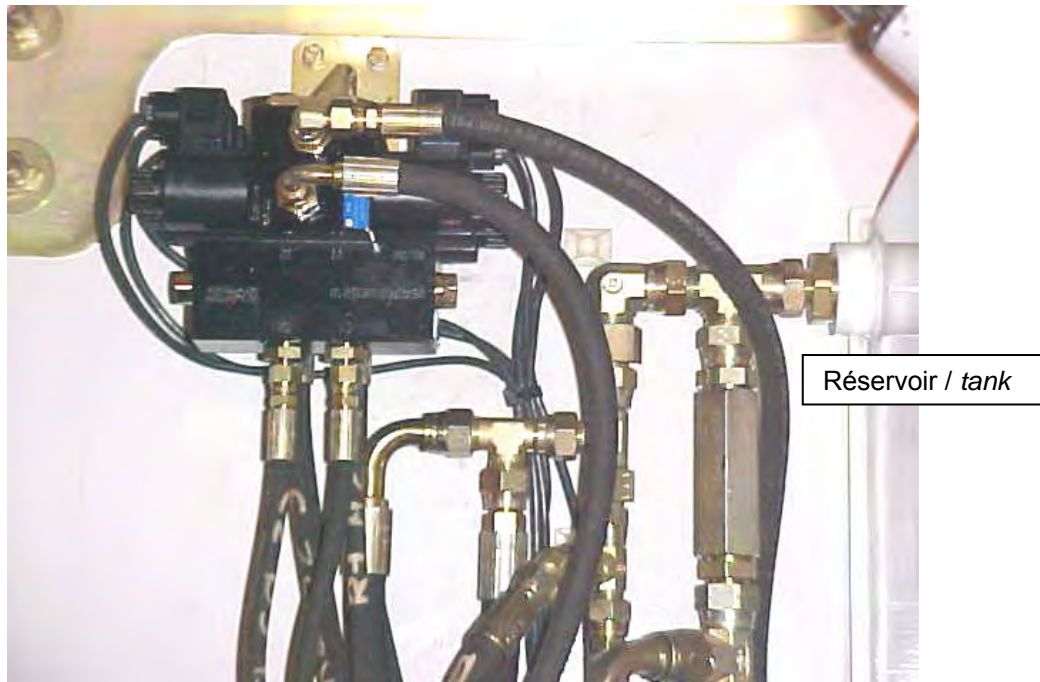
La valve YV34 sert de by-pass afin d'éviter d'avoir de l'orientation tourelle aléatoire dues à des pressions résiduelles dans le circuit (ex LS)

YV34 se ferme uniquement lorsque le mouvement d'orientation est sollicité afin d'envoyer la pression au moteur, ensuite le sélecteur de circuit aiguille la pression dans le sens désiré (Droite ou Gauche).

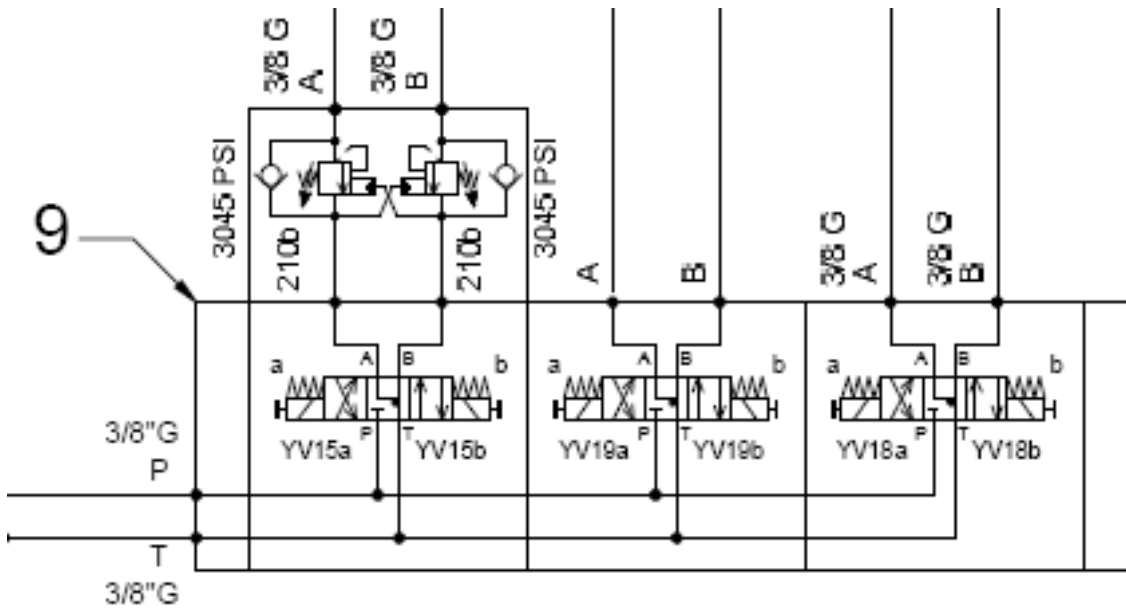
The YV34 is a by-pass valve in order to avoid to have random turret rotation movements due to remaining pressures in the circuit (example LS pressure)

YV34 is closed when turret rotation movement is asked , the pressure is sent to the motor , then the circuit selector dispatch the flow to the correct way (Left or right) according to the operator demand.

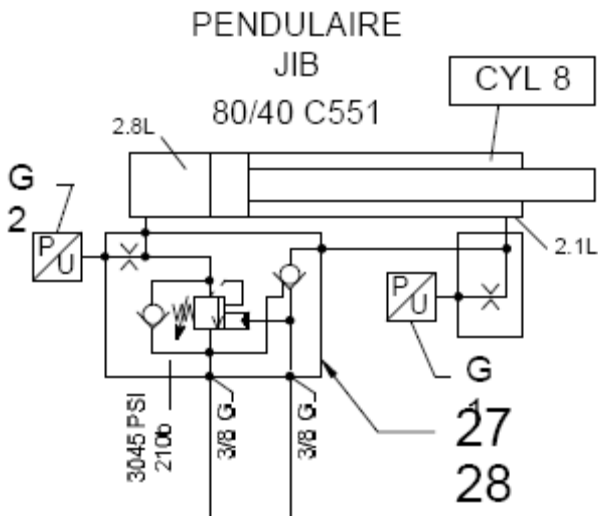
15-Distributeur panier (3 tranches) rep 9 / Cage valve(idem HA32PX)



YV15 A et B : Compensation panier (vérins émetteur et récepteur)/ cage levelling (master and slave)
 YV 19 A et B : vérin rotatif panier / rotative cylinder for cage
 YV 18 A et B : vérin pendulaire / jib cylinder



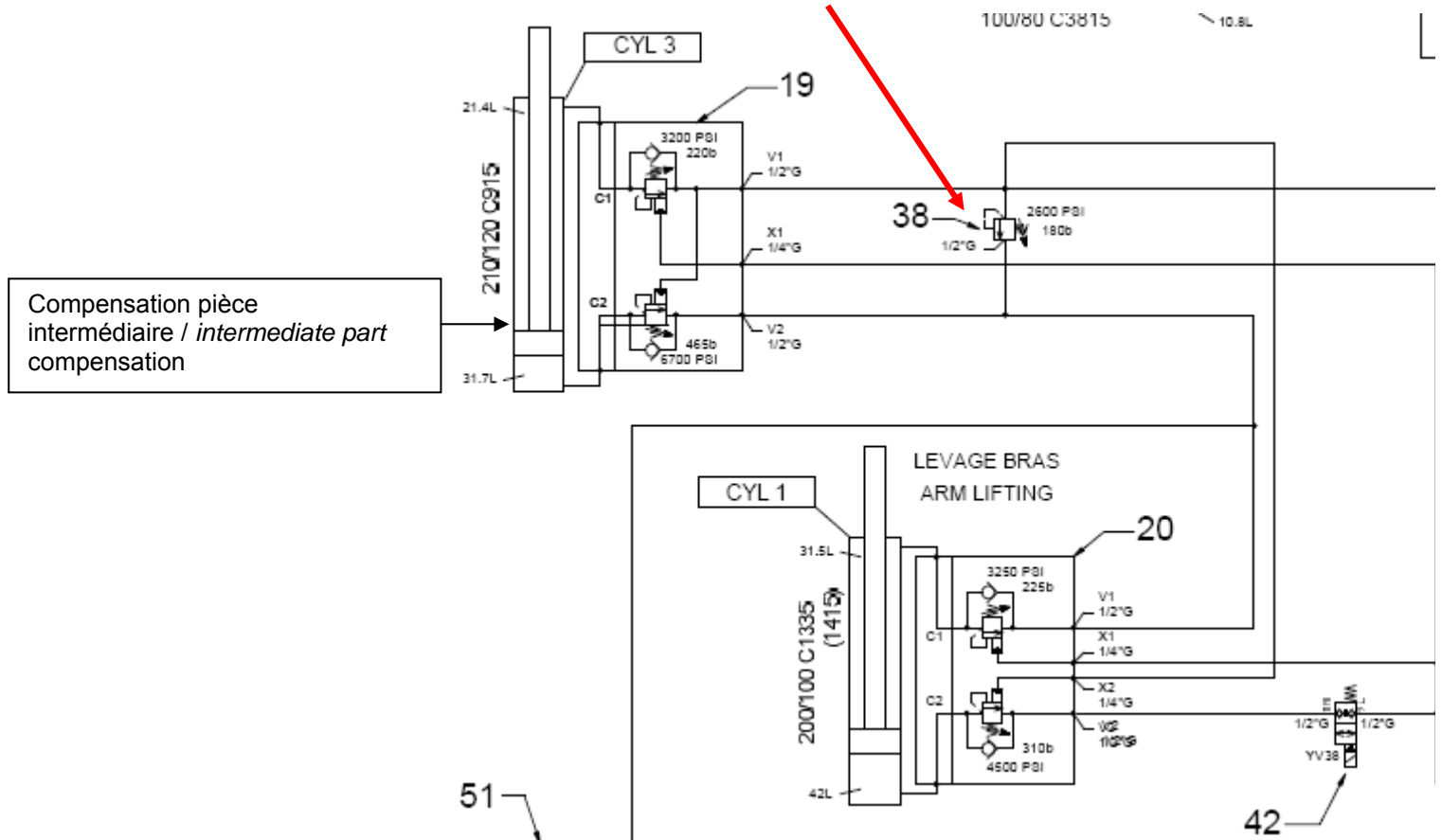
16 Capteurs de pression pesage sur vérin pendulaire / *pressure sensors on jib cylinder*



G1 capteur de pression Petite Chambre (PC) / *pressure sensor on Small chamber*
 G2 capteur de pression Grande Chambre (GC) : *pressure sensor on Big chamber*

17-Asservissement bras / primary boom monitoring process

Le limiteur de pression (pièce 38) sert de soupape de sécurité pour la descente bras, ainsi que pour le recalage bras mais ce n'est pas suffisant , c'est pourquoi on a besoin du recalage manuel (cf pièce 37)/ the pressure limiter is for the safety primary boom descent and for primary boom re-adjustment



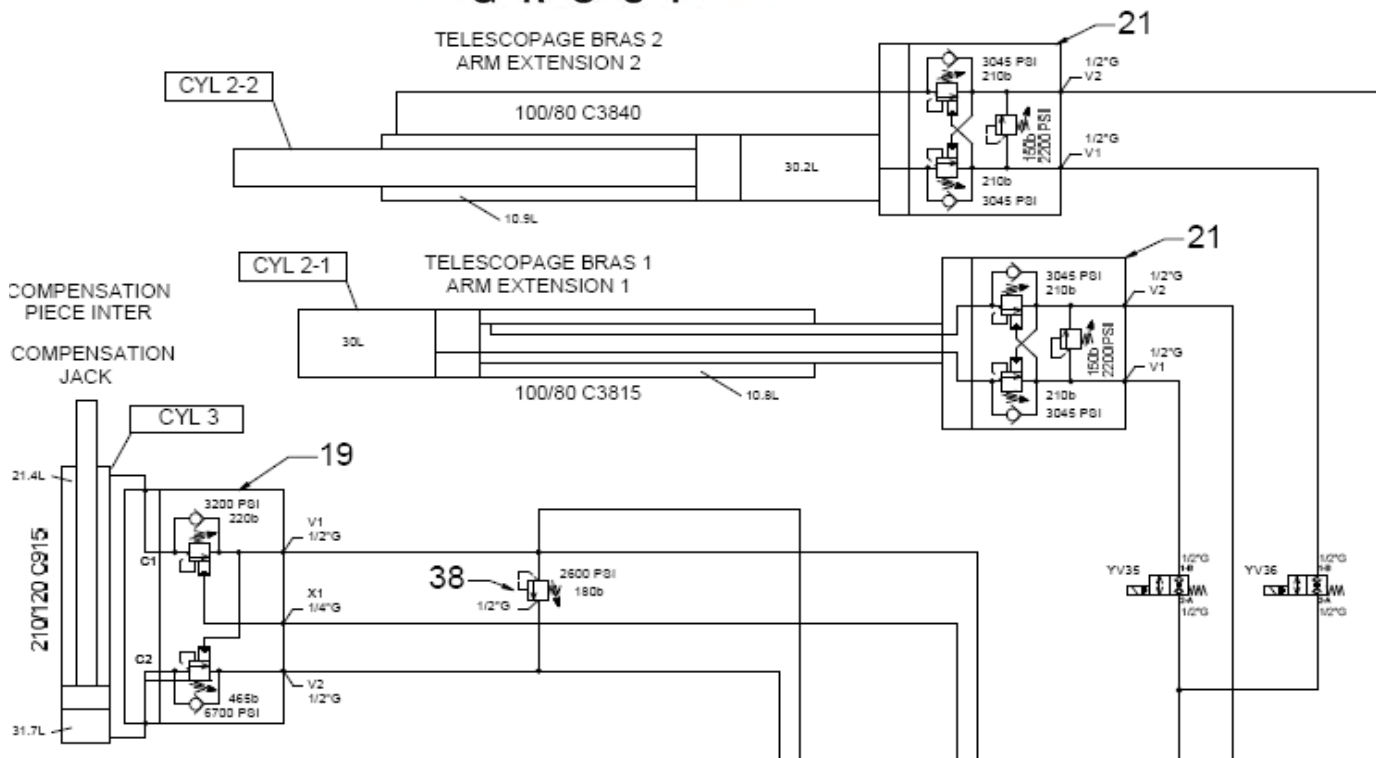
La synchronisation des deux vérins est réalisée par transfert de volume entre la petite chambre du vérin de levage bras et la grande chambre du vérin de compensation (cyl 3)
YV 38 pièce 42 (sécurité vérin pour la descente bras)

*The synchronisation of the 2 cylinders is realised by oil volume transfer between the small chamber of the primary boom lift cylinder and the intermediate part levelling cylinder (Cyl 3)
YV38 (part 42) as the safety of primary boom cylinder during the descent*

Pièce 21 valve équilibrage vérin télescope bras interne (cyl 2-1):
Cylinder 2-1 relief valve for internal telescopic primary boom cylinder



Pièce 21 (valve équilibrage vérin télescope bras externe : cylinder 2-2)
relief valve for external telescopic primary boom cylinder



YV35 et YV36 : électrovannes de sélection pour sortir le télescope bras section I puis bras section II (et vice-versa en descente pour éviter la désynchronisation , grâce aux clapets anti-retour double

Note La tension appliquée venant du tiroir YV6 est fonction de Vbat (le télescope section II commence à sortir alors que la section I n'est pas encore arrivé en butée : mouvements synchronisés plus souple), voir tableau ci-après.

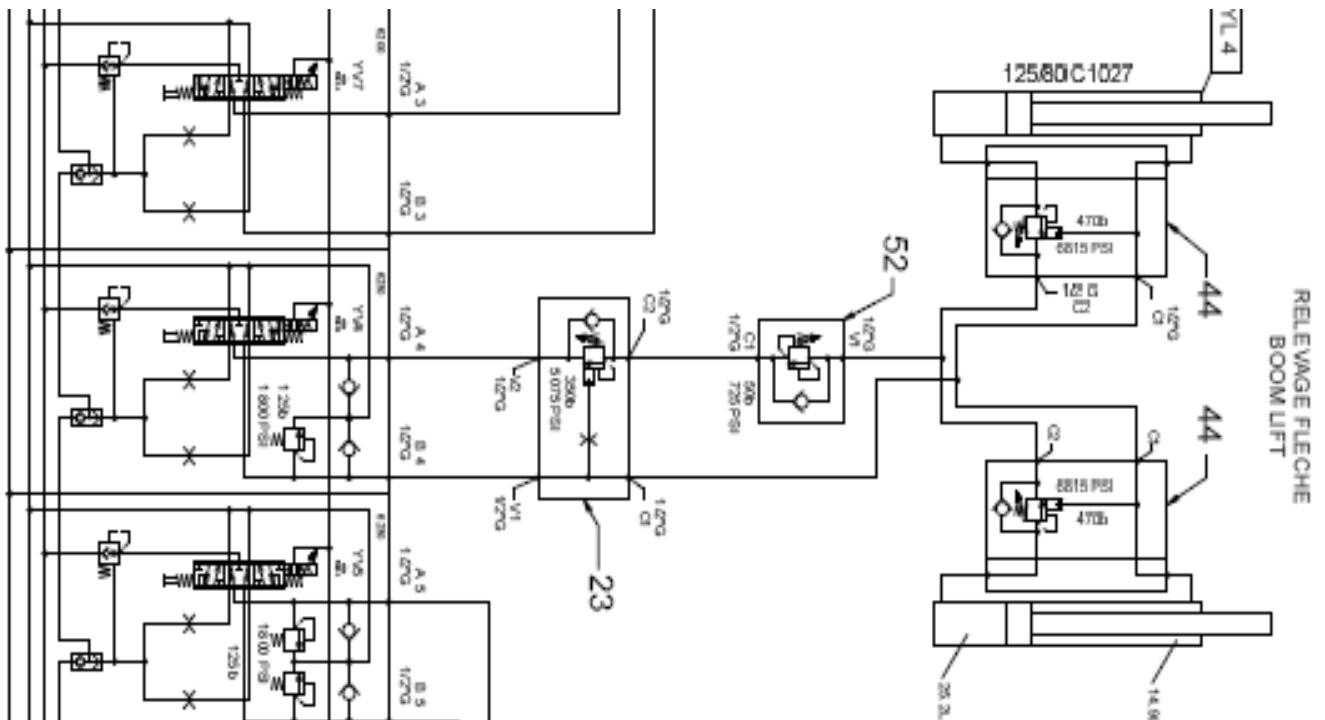
The applied voltage coming from YV6 is proportionnal to Vbat (the 2nd telescopic section starts to get out before the 1st section has reach its upper limit : the movements are smoother)

YV35 and YV36 are selection valves in order to get out the 1st telescopic primary boom then 2nd telescopic primary boom in order to avoid the out of boom synchronisation

Note : *The applied voltage coming from YV6 is proportionnal to Vbat (the 2nd telescopic section starts to get out before the 1st section has reach its upper limit : the movements are smoother)*

ARM EXTENSION		YV1	YV6 Us/Udc	YV35	YV36
SECTION 1	OUT	1	45 à 25%	1	0
	IN	1	55 à 75%	1	1
SECTION 2	OUT	1	45 à 25%	1	1
	IN	1	55 à 75%	0	1

19-Relevage flèche / Main boom lift



Pièce 23 : valve équilibrage et synchronisation en descente
Relief valve and synchronisation in descent

Pièce 52 : ce limiteur de pression a un rôle de soupape , il évite les désynchronisations et les pompages en levage flèche (pour info , le tiroir est un tiroir pression qui gère donc la pression en montée comme en descente , contrairement à un tiroir débit qui ne gère la pression qu'en montée)
This pressure limiter avoid the out of synchronisations and the pumping movements in main boom lift

20-Valve manuelle de réglage de la compensation / Manual valve for compensation adjustment (rep 37)

Bras en butée basse, vérifier que la pièce de liaison est correctement positionnée : machine positionnée sur un sol horizontal, l'arrête supérieure de la pièce de liaison doit être horizontale.

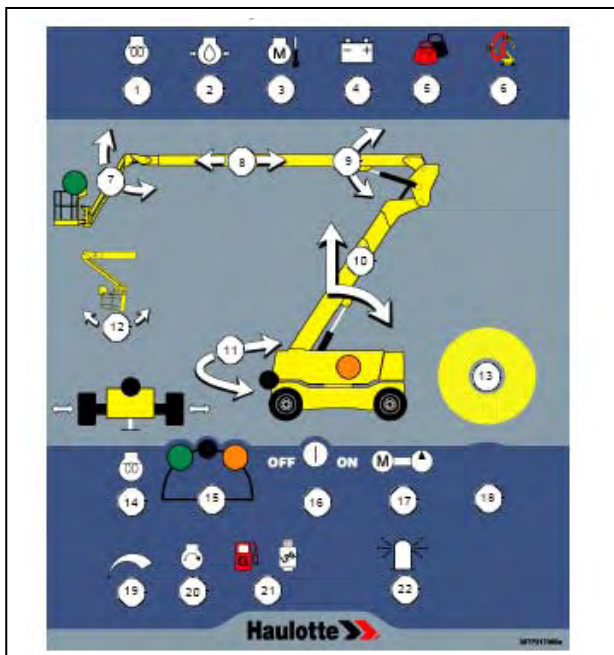


Si la pièce de liaison est décalée, il est interdit d'utiliser la machine tant qu'un repositionnement correct n'est pas effectué



Croquis 1 : pièce de liaison en AV

Croquis 2 : pièce de liaison en AR



RECALAGE COMPENSATION
RESET COMPENSATION

37

Procedure in order to compensate the primary boom :

If the compensation part is moved backwards(see picture 2) , the compensation is automatic if the machine is completely folded down when primary boom is at the lowest position

If the compensation plate is moved forwards (see picture 1) , apply the following procedure :

- 1- *lower the primary boom at the lowest position*
- 2- *Lift the main boom at about 10°*
- 3- *Ask the primary boom descent (hold the toggle switch from lower control box) and push the black rubber button located above the main Danfoss main bloc (see photo), with this the compensation plate will come back to its original position*
- 4- *Do again step 2 and 3 up to get the levelling cylinder in lowest position (bottom position)*
- 5- *Do a complete cycle (primary boom lift and descent)*

21-Les pressions prise sur le PVG32 / pressure on proportional valves

Générale – Main pressure	240 +/-5 Bar
stand-by – Load Sensing	35+/-5 Bar
groupe de secours/ emergency pump	130+/-2 Bar
levage bras en butée haute / primary boom lift in upper position	225 -0/+10Bar
levage bras en butée basse / primary boom in bottom position	240 +/-5 Bar
télescopage bras en butée rentrée / primary telescopic boom maximum re-entry	135 +/-5 Bar
télescopage bras en butée sortie / primary telescopic boom out	185 -0/+10 Bar
relevage flèche butée haute / main boom lift upper position	240 +/-5 Bar
relevage flèche butée basse/ main boom lowest position	165 +/-5 Bar
télescopage flèche sortie/ main boom telescopic out	135 -0/+10 Bar
télescopage flèche rentrée/ main boom telescopic maximum re-entry	240 +/-5 Bar
sortie caissons essieu avant / front axle out	90 +/-2 Bar
rentrée caissons essieu avant / front axle re-entry	145 +/-2 Bar
sortie caissons essieu arrière/ rear axle out	90 +/-2 Bar
rentrée caissons essieu arrière / rear axle re-entry	145 +/-2 Bar
réglage soupape de recalage pièce de liaison / intermediate part pressure limiter adjustment	200 +/-5 Bar