

The UAX13 - Dialling the First Digit

The UAX13 Group Selector is seized by a calling loop via the associated linefinder and returns a holding earth on the incoming P wire and dial tone on the speech path.

It steps vertically in response to the first digit dialled by the caller.

It then determines whether or not that level is allowed to that caller.

If not it returns NU tone to the caller.

If the level is allowed, the selector drives into the bank to find a free final selector, junction relay set or similar.

It looks for a battery on the P wire which indicates a free outlet.

On finding a free outlet, it earths that outlet to busy it and extends the calling loop to the next selector.

The group selector then holds to the earth returned on the P wire from the next selector.

When the caller hangs up, the next selector removes the earth from the P wire which allows the group selector and its associated linefinder to restore to normal.

Should a caller listen to dial tone without dialling (often this will be a fault condition), the selector will force release the call after around one minute and leave the caller "parked" onto the P relay in his line circuit. This will light the PG alarm lamp when the alarm button is pressed on the C unit.



When the group selector is normal it returns a testing battery back to the linefinder, allotter and control relay set via the P wire. If the selector is in use (B relay operated), off normal (N2 springs operated), busied (red link removed from test springs 13 and 14), or the selector fuse has blown, the selector and its linefinder is busied to the allotter and control relays set.

Setting up a Call from a Regular Line Circuit

If free, the selector is initially taken into use by an earth received over the - wire from the control relay set.

This operates relay A which in turn operates relay B.

B3 replaces the battery on the P wire with an earth.

B5 operates relay CD

B2 and CD1 operate relay CC

CC3 and CD3 connect dial tone to the 570 ohm winding of the A relay, which acts as a transformer to return the tone to the caller.

Dial pulses release and reoperate the A relay. When A is released, A1 short circuits relay B which does not release as this action makes it slow to release.

A1 also passes an earth to the vertical magnet from B4 and via CD4 and the low resistance winding of relay CD. The pulses step the selector vertically.

At the first step, the N springs operate.

N3 disconnects the original winding of relay CD but the relay continues to hold during vertical stepping as it is both slugged to be slow releasing and it receives regular pulses of magnet current.

When pulsing of the first digit ceases, the selector stops stepping vertically and the cessation of magnet current allows relay CD to release.

Assuming this is a call from a regular caller there will be no holding effects from conditions on the vertical marking bank for that level and this will allow CD1 to release relay CC.

CC3 disconnects dial tone.

CC1 connects the self drive circuit to the rotary magnet via N1 now operated as the selector is off normal. The selector drives around the selected level looking for a battery condition on the P wire.

When a 150 ohm battery condition on the P wire is found marking the first free outlet, relay HX operates to this condition.

HX1 disconnects the drive circuit so that the selector stops on the chosen outlet.

HX1 also completes a circuit to operate relay H to the B3 earth on the incoming P wire. Relay CC also re-operates to the earth supplied via HX1.

H7, H3 and H2 extend the P+- wires through to the next selector or relay set. Relay A is disconnected and releases.

The next selector or relay set now returns a holding earth on the P wire which will hold relay H even when relay B subsequently releases.

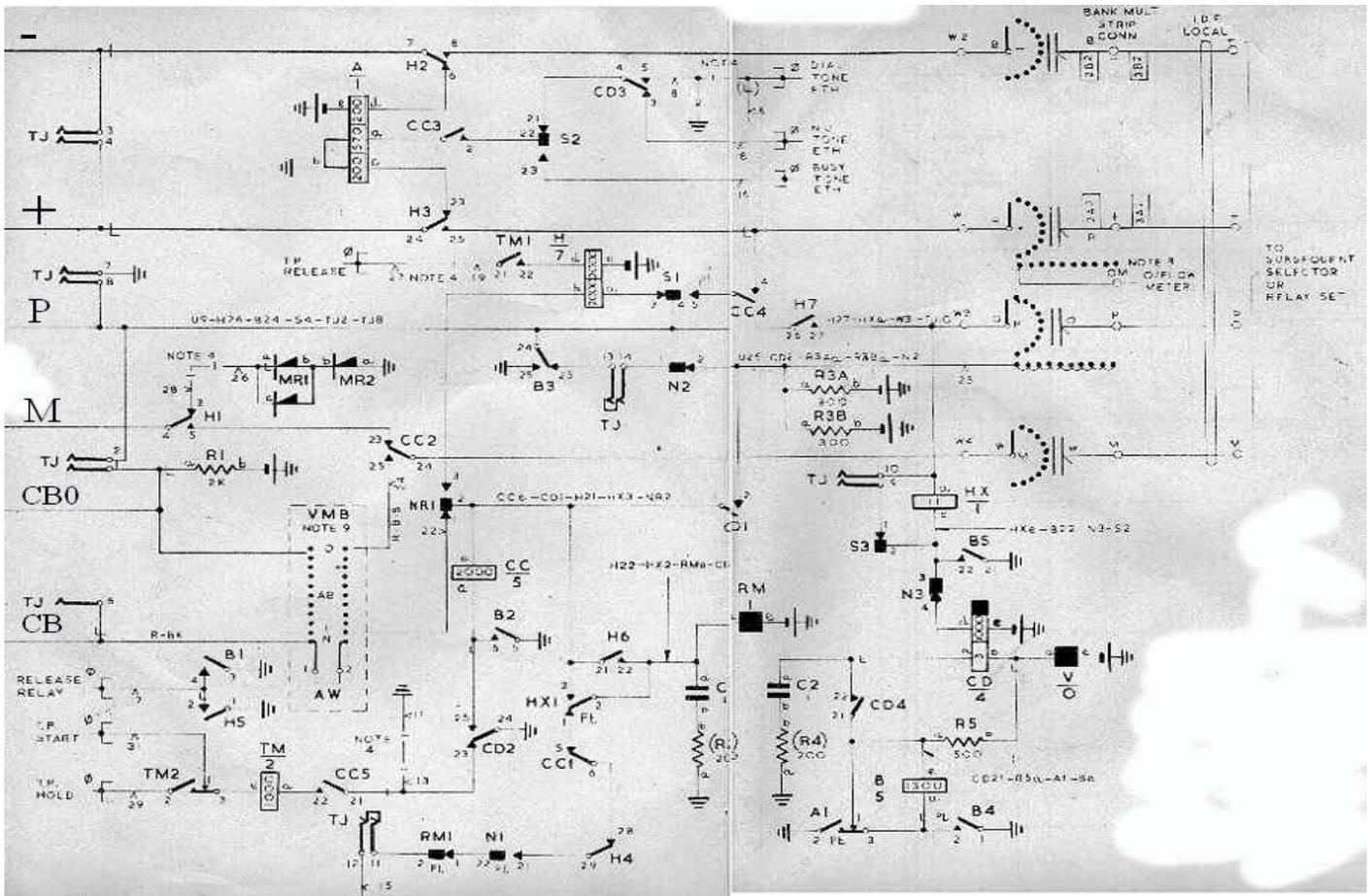
A1 short circuits relay B which releases slowly.

When B has finally released, the B3 earth is removed from the P wire which is now through to the next selector and is receiving a holding earth from there.

B2 releases relay CC.

CC2 connects the M wire through from the line circuit to the following selector. This wire will later be used to feed pulses back to operate the caller's meter if required.

The selector is left with the - + P and M wires connected through from the line circuit to the following selector. The earth returned on the P wire from the following selector holds the H relays in both the group selector and the linefinder and by this means holds the selectors in place and switched through.

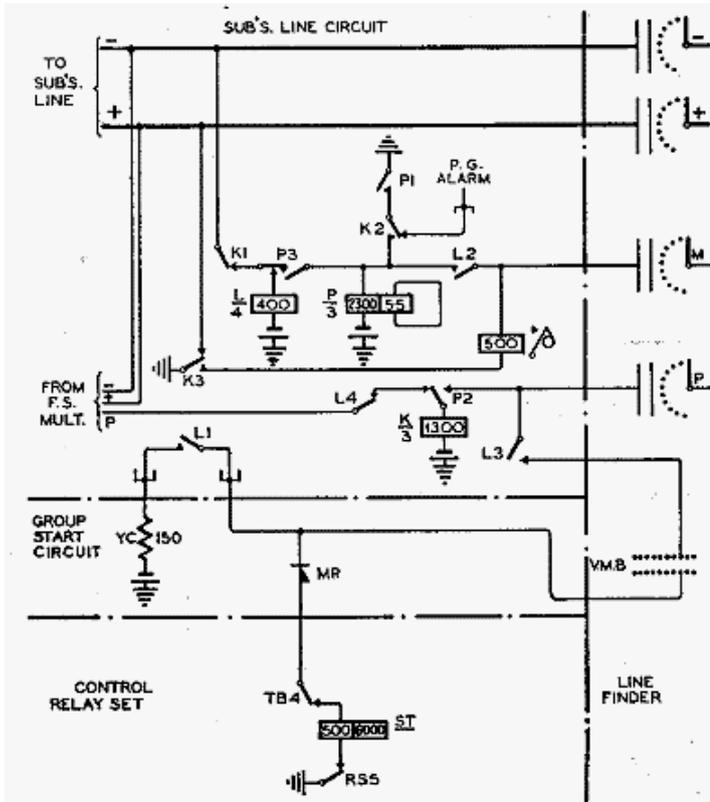


The caller now dials further digits into the next selector or relay set

Clear Down

When the caller hangs up, the selector or relay set further along the connection removes the holding earth from the P wire. This releases any H relays holding to this earth. H4 connects up the rotary magnet self drive circuit to the release alarm earth connected to U15 on the diagram. This will cause the selector to drive on out of the bank and eventually to restore to normal. In turn this will place the N springs back to their normal position and at N2 reconnect the P wire battery to make the selector available again.

Note that to release, the selector needs a low resistance earth on the release alarm wire. This is provided by the release relay in the alarm circuit so long as there has been an earth on the release relay wire immediately prior to clear down. Contacts B1 or H5 provide this earth.



Failure to Dial First Digit

Should the caller not dial, then the A, B, CD and CC relays are held in the selector. The strap between U11 and U13 is provided on group selectors associated with linefinders so that CC5 connects relay TM to the TP start lead. When the TP start pulse arrives relay TM operates and holds to the TP hold wire.

Around a minute later the TP release pulse arrives to operate relay H via TM1. H2 and H3 disconnects relay A which releases and in turn releases relay B.

During the release lag of relay B, the vertical magnet is energised and the selector steps vertically to level 1 thus operating the N springs.

B5 removes the holding earth from the P wire which in turn releases the H relay in the linefinder and the K relay in the line circuit.

Relay P is slow to release due to the short circuited winding and this lag holds the relay whilst K2 removes the hold condition but K1 and K3 apply the

caller's loop to the P relay.

With the release of relay B, relays CC, TM and H also release and the selector drives round level 1 until it restores to normal.

The selector and linefinder are then ready to accept further calls.

The line circuit P relay holds to the loop and prevents the L relay from reoperating. The caller is said to be "parked" with P1 providing a PG alarm to the C unit.

All Outlets Busy

If all outlets on a level are busy, the group selector will drive around that level looking in vain for a P wire battery. Eventually the selector steps onto the 11th outlet of the level. At this point the S springs are operated within the selector.

The wipers on the 11th step allow relay HX to operate from the B5 earth to the 150 ohm battery within the selector.

HX1 cuts the rotary drive stopping the selector.

The operation of the S springs prevent relay H from operating so that relay A remains connected to the caller's loop.

HX1 also holds relay CC.

CC3 and S2 connect busy tone to the A relay to be returned to the caller.
Relay CD releases with the cessation of magnet current.

Should the caller continue to dial, the pulses to the A relay are ineffective as the magnet path has been disconnected at CD4.

B5 continues to hold the incoming P wire.

The selector will now “time out” via the TM and H relays as described above. Eventually it will force release the caller if he does not clear down.

Call Discrimination

Callers can be connected to the exchange as “ordinary” or “coin box” lines. These two classes of lines can then be given access to different levels of the group selector. Generally this means that coin box lines are barred from some levels.

The linefinder levels 3-7 are used by ordinary lines and level 8 is used by coin boxes.

Then when a coin box line calls, NP (normal post) springs on level 8 operate in the linefinder and connect a 150 ohm battery to both the CB and CB0 wires from the linefinder to the group selector. This CB battery informs the group selector that a coin box is calling. The CB0 battery is used on some junction arrangements and is not used at Norchard.

There is a complication. Level 7 and level 8 are teed together and between them can only be connected to 10 line circuits.

Each of these line circuits has the start condition taken out to straps which can be connected to start the line circuit onto level 7 if the line circuit is an ordinary line, or level 8 if the line circuit is connected to a coin box.

This arrangement allows flexibility of use of these line circuits.

The CB wire 150 ohm battery condition is used within the group selector to determine whether or not to allow the connection to continue.

The CB wire is strapped to those levels on the left side of the vertical marking bank which are barred to coin boxes.

U22 from the CC relay is connected to the right hand side of levels barred to coin boxes.

Should a coin box dial the barred level, the battery prevents relay CC from releasing. Relay CD releases on the cessation of magnet current and disconnects the vertical magnet.

CD3 disconnects dial tone and substitutes NU tone instead.

The calling coin box hears the NU tone and generally clears down. If he does not the selector will eventually time out using relays TM and H resulting in the coin box line being parked back in his line circuit.

Note that at Norchard the coinbox feature is used to discriminate on rack A1 between on site phones and off site phones, and on rack A2 between on site phones and museum demo phones.

This prevents off site phones from dialling 222 and setting off the fire warning system and prevents demo phones from dialling any level other than for other demo phones or ring back.